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COMPUTERWORLD

INSIDE

U.S. indicts trio; secrets theft cited

Former SRI co-workers named in Pac Bell case

BY MICHAEL ALEXANDER
CW STAFF

SAN JOSE, Calif. — A trio of hackers were able to illegally penetrate a U.S. military computer and steal classified information, federal investigators said last week. One of the hackers, investigators said, also burglarized a telephone company office and stole sensitive information related to an FBI investigation of deposed Philippines President Ferdinand Marcos.

In an indictment unsealed last week, a federal grand jury in San Jose, Calif., charged Mark K. Lottor, 25, Robert E. Gilligan, 31, and Kevin Poulsen, 24, with 19 counts of conspiring to break into government and Pacific Bell Telephone Co. computers, stealing access codes and telecommunications equipment and wiretapping conversations. The indictment said the men, formerly co-workers at renowned security firm SRI International, carried out their activities from June 1985 to April 1988.

The indictment alleges that in October 1987, Gilligan sent the access codes to a U.S. military computer on the U.S. Army

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AT&T crash has users wary

BY ELLIS BOOKER
CW STAFF

Be thankful it was a holiday. That is how many AT&T business customers summed up the chaos that gripped their carrier's long-distance network for nine hours last Monday.

While the unprecedented network disruption inconvenienced many — only half of all calls placed were successfully completed, with companies using toll-free 800 services experiencing the most difficulty — business customers generally seemed to accept this as an extraordinary event. The incident occurred on Martin Luther King Jr.'s birthday, a national holiday, when government agencies and many businesses were closed.

Minutes after an AT&T signaling processor serving New York experienced the first software-induced fault, tens of millions of phone customers across the country were unable to complete calls. The 114 switches in AT&T's network continually interrupted their own call processing in response to waves of call-setup requests from other nodes in the network.

"The banking industry is very lucky that it was a national holiday," said Jerry Appleby, a vice-president at Security Pacific Automation Co., located in Los Angeles.

Appleby, past chairman of the 2,000-member Tele-Communications Association, said that his institution uses network redundancy as well as a variety of service providers. "The Hinsdale

Continued on page 8

We're sorry, all circuits . . .
Monday, Jan. 15 was a black day for AT&T's long-distance operation

Bankruptcy throws wrench into Campeau centralized IS

BY MARYFRAN JOHNSON
CW STAFF

Bankruptcy never arrives at an opportune moment.

That may be especially true for the newly centralized information services operation that handles all data processing for Toronto-based Campeau Corp.'s 258 upscale department stores in the U.S.

One week ago, Campeau's two U.S. retail operations — Federated Department Stores and Allied Stores Corp. — filed for court protection from creditors and claimed debts of $7.5 billion.

During the past 18 months, the now-bankrupt retail chains have slowly dismantled their own IS shops and transferred all applications to The Sabre Group in Atlanta, a wholly owned data processing operation created four years ago by Campeau.

Now the fate of such stores as Bloomingdale's and Jordan Marsh rests in the hands of a federal bankruptcy court judge in Cincinnati.

"The biggest problem I see, depending on how the Chapter 11 is resolved, is that the court

Continued on page 133

Industry forecast: Rain, then sunny

Slow 1990 seen giving way to business upturn as new applications emerge

BY NELL MARGOLIS
CW STAFF

Months' worth of public keening aside, there are banner years ahead for the computer industry, according to industry observers. However, 1990 is not likely to be one of them.

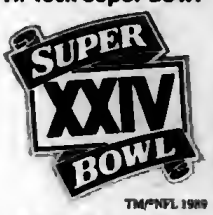
Analysts agreed that gathering forces both within and beyond the industry are converging to serve up a year of slow growth, tarnished stock prices and woe for any vendor not ready to offer the customer what he needs, when he needs it and in sound working order.

"In many ways, the computer industry is a victim of its own success," said Martyn Roetter, a technology sector consultant at Cambridge, Mass.-based management consultancy Arthur D. Little, Inc. "It can't continue to grow at multiples of the GNP . . . and with the continuing blistering pace of technological evolution, computer companies can't cut R&D in half and expect to survive, as is an option in some other sectors."

Complicating life for computer vendors is the fact that they must become more sensitive to customers and better at engineering as their customers become more sophisticated and more demanding,

Continued on page 132

Hi-tech Super Bowl



TM/©NFL 1989

- Montana and Elway may air it out, but computer says defense will rule. Page 4.
- Mary Oliveti is the NFL's behind-the-scenes quarterback, managing an all-league network. Page 79.
- NFL computer managers don't make beer commercials, but they are a rare breed. Page 117.

IN THIS ISSUE

UPDATE

Thought for the day: The biggest selling car in America in 1989 was made in America. By American workers. Largely with American materials. And was exported in mass quantities to Japan. It was the Honda Accord. As we contemplate our continued slide in the world economic picture and search for that elusive competitive edge, we might first ask whether all strategies are aimed at two simple goals: making products of unimpeachable quality and selling them at a fair price. And let's stop blaming our government, their government, our workers, etc. for subpar efforts at competing in a global marketplace.

ED SEAMAN

Computers shoulder a special work load at Wearguard. Page 29.

ANDY FREEBERG

Curtis Carlson leads David Sarnoff Research Center staff developing a video supercomputer for real-time video applications. Page 22.

EXECUTIVE BRIEFING

■ **Last week's AT&T software glitch,** which disrupted long-distance calls nationwide for nine hours on Jan. 15, may cause some U.S. companies to consider having more than one long-distance carrier available for backup purposes. AT&T customers, however, praised the firm for keeping them apprised of the situation. Network-switching software experts said that such bugs are inevitable and common because of the complexity of the programs, but they usually affect only a small number of calls. **Stories pages 1 and 8.**

■ **Innovation is imperative** for an organization's future growth, says consultant John Diebold, but it doesn't guarantee success. He notes that pioneering firms often fail to capitalize on their inventions and thus forfeit great economic and social opportunities. The best organizations, he concludes, mix a long-term commitment to innovation with business savvy. **Page 105.**

■ **Campeau's filing for Chapter 11 protection** casts doubt on the future of its highly centralized information systems. Most of the 258 Federated and Allied stores have dismantled all but personal computer operations and transferred processing to The Sabre Group, Campeau's information systems unit in Atlanta — threatening IS support if Campeau is broken up. **Page 1.**

■ **"Death by disinterest"** was the eulogy for U.S. Memories, the fledgling DRAM manufacturing consortium of U.S. chip makers that was scuttled for lack of investment. Falling DRAM prices and the specter of anticompetitiveness dampened early enthusiasm for the much-heralded venture. **Page 6.**

■ **Rough seas in 1990** for computer vendors could mean smooth sailing for customers. In the face of slumping sales, vendors must do even more to woo users with more choices, lower prices and better support. The current industry state was reinforced by dreary fourth-quarter results from IBM and DEC and a job cut announcement at Apple. **Pages 1 and 132.**

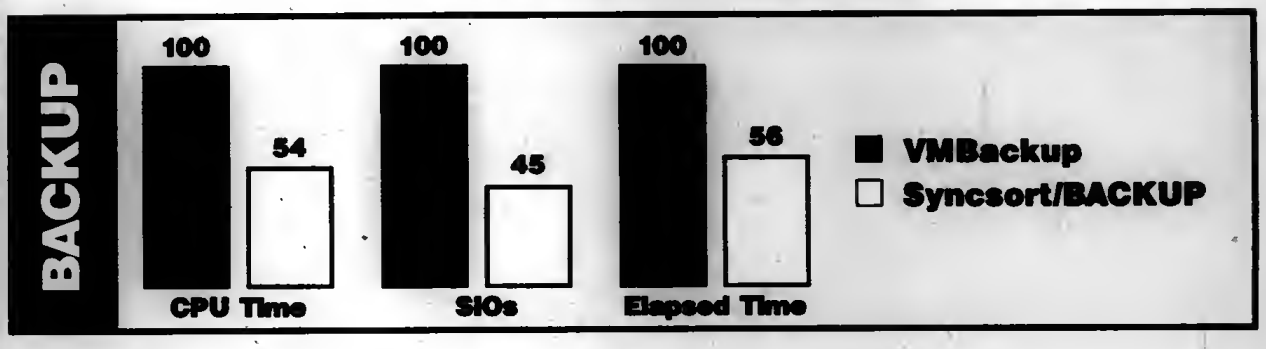
■ **The Bush administration kicked off** an intensive study of the U.S. telecommunications infrastructure to ensure that it will adequately support U.S. companies competing globally. The government will consider earmarking the 3% telephone excise tax for network improvements. **Page 71.**

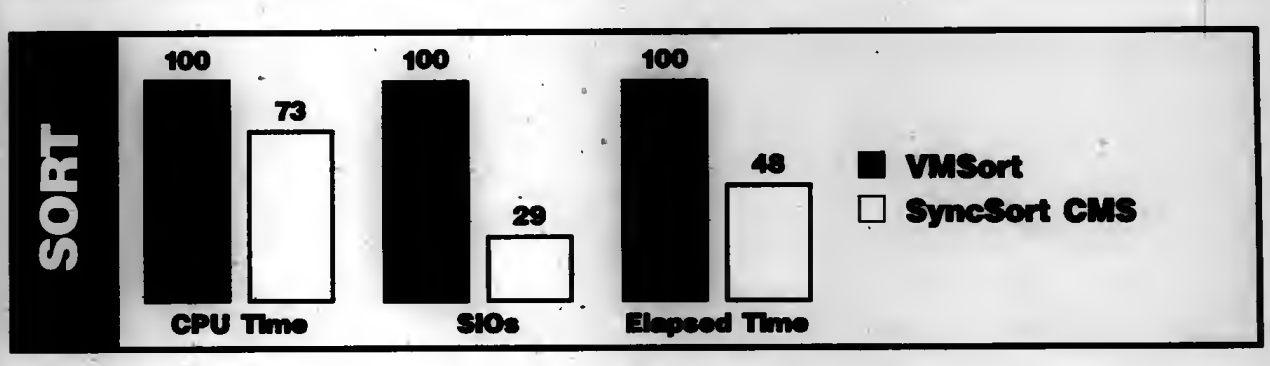
■ **The trial of alleged Internet hacker** Robert T. Morris will go to the jury this week. Morris testified last week that the November 1988 virus that froze computers nationwide was an experiment that went beyond his control. **Page 8.**

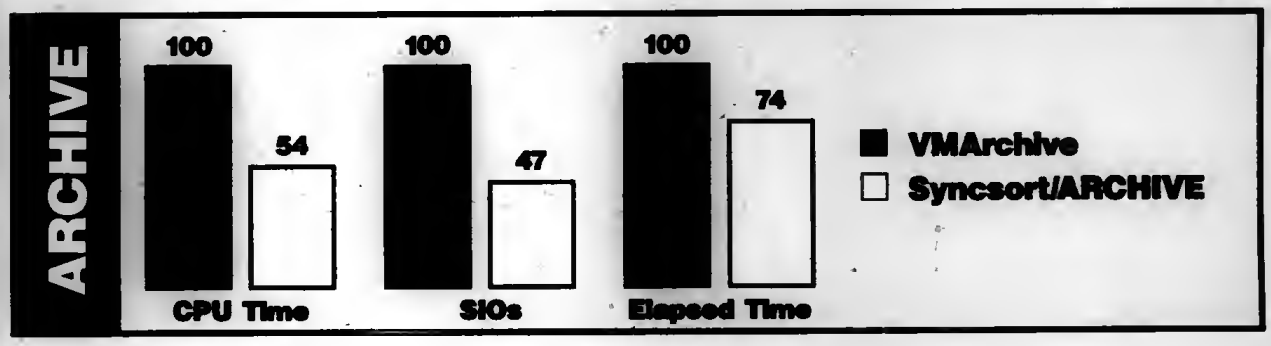
■ **Current maintenance tools** go beyond the requisite screwdriver, mostly because servicers have ventured beyond merely fixing hardware. To stay competitive in a game that even the players find hard to follow, the providers are not only finding more services to offer, they are making an effort to do it more simply. **Page 85.**

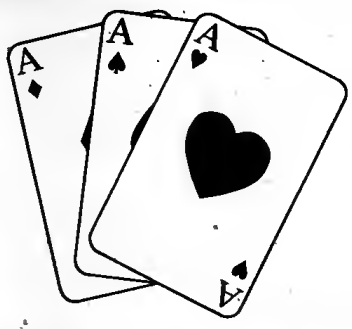
■ **On-site this week:** Tyson Foods, the largest poultry processor in the U.S., is trading its Unisys mainframe-based Unix network for a bird of a different feather — DEC VAXs. The Springdale, Ark., firm will spend almost $10 million in three years to create an environment for distributed applications across six sites nationwide. **Page 71.** Prime minicomputers linked to 300 desktops via Apollo's NCS make up the technology wardrobe at Wearguard, a Norwell, Mass., maker and seller of work clothing. Wearguard chief executive officer Richard Salem is committed to the idea of putting high-tech to work in a low-tech business. **Page 29.** Brevard County, Fla., is piloting Nixdorf imaging technology in its court system, with a target date of 1993 to convert some 2,000 documents per day into electronic form. **Page 29.**

VM PERFORMANCE FROM SYNCSORT









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WHERE PERFORMANCE IS THE ISSUE.

Odds are, this Bud's for the 49ers

Computerized Super Bowl handicapper predicts bad news for Broncos

BY BRUCE HOARD
SPECIAL TO CW

In the past, Bud Goode has been known to act more like a procrastinator than a prognosticator. I have had to wheedle, implore and cajole him in order to get an unequivocal Super Bowl pick. Not so in this year of The Overwhelming Favorite.

Now he is Bold Bud, and for those of you who are counting, this is our ninth computer-based Bud bowl story. So who does Bold Bud believe will be beaten badly in Super Bowl XXIV? It ain't San Francisco, Bronco breath.

Yes, Bud has hopped on the 49er bandwagon, picking the team with the National Football League's highest scoring average (27.6 points per game) to eclipse the team with the league's best defense (14.1 points allowed).

However, he has set only a 7½-point spread, which at press time was four points under the Las Vegas line.

That may not seem like such a bold pick at all, perhaps because it is not based on the emotionalism that drives human-based predictions. Bud relies on a more objective process, a regression analysis built on 174 variables that are crunched weekly during football season by his Franklin Computer Corp. AT.

So what are this year's telling Super Bowl stats? Bud, who picks 'em against the line for *The New York Post*, immediately points to defense. "The 49er defense is probably going to win the game," he says. This despite the fact that Bronco defenders held opponents to the aforementioned 14.1 points per game, while the 49ers were third in the league, allowing only a slightly less stingy 15.8 points.

The difference is this: In the 28-team league, Denver played the 24th toughest schedule, while San Francisco played the 10th toughest. And, as Bud notes, the 49ers got better and better — most recently holding the Los Angeles Rams to a meager three points in their National Football Conference championship tilt.

OTTO GRUELE/ALLSPORT USA

MIKE POWELL/ALLSPORT USA

Quarterbacks *Joe Montana of the 49ers (left) and John Elway of the Broncos have the arms, but defense may hold the Super Bowl key*

Much has been made of the teams' two quarterbacks, Joe Montana of San Francisco and Denver's John Elway. Based on the ratio of passing touchdowns to interceptions — a very important stat to Bud — Montana is clearly superior. Behind Montana, the San Francisco offense struck for 3.2 passing touchdowns for each interception — the best in the league. The ratio for Elway is a league-average 1-to-1.

Rubbing it in

"So how much better is Montana than Elway?" Bud asks, knowing full well the answer. "3½-to-1 vs. 1-to-1. When we're talking differences, this is fantastic. On that stat, the San Francisco defense has a 6.9-point advantage."

The matchup seems close when you consider that the 49ers led the league offensively while the Broncos led defensively.

He has some advice for the Denver defense: "You have to pressure Montana with no more than four guys because he reads [defense] faster than anybody. If you blitz and dog, he'll read, and he'll burn you."

So in real life, on-the-grid-iron, bash-face football terms, how will it all turn? Bud says Denver will fall behind, attempt to come back on the strength of Elway's arm and fall short. Readers may remember he made a similar — and correct — prediction before Super Bowl XXI, when the Broncos were beaten by the New York Giants.

Hoard is a consultant and former editor of *Network World*.

Zenith hedges bets with dual-bus plan

BY RICHARD PASTORE
CW STAFF

NEW YORK — One of the Gang of Nine has sold out — at least partially. Even as it introduced its first machine based on EISA, Zenith Data Systems acknowledged last week that it will also support IBM's rival Micro Channel Architecture (MCA).

"The decision to support both architectures is a market necessity," said Zenith President and newly appointed Chief Executive Officer John Frank. Among the core Extended Industry Standard Architecture (EISA) proponents, Tandy Corp. and Ing. C. Olivetti & Co. have previously announced support for both architectures.

Francis Lorentz, chairman of new Zenith parent Groupe Bull, explained the need for Zenith's capitulation. "Zenith has invested much in EISA, and it will become a success worldwide," Lorentz said. "But MCA is a must if we want to be competitive in large corporate accounts worldwide."

The Paris-based Bull has been selling its own MCA personal computers in Europe, where the architecture has caught on faster than in the U.S. However, now that Lorentz has placed Zenith in charge of Bull's global PC operations, Zenith must embrace MCA to serve the European market demand.

For the foreseeable future, though, U.S. customers will see only the EISA banner from Zenith. "In the U.S., the initial thrust will be EISA," Frank said. Zenith will introduce MCA machines in the U.S. if demand for EISA sours or if MCA "shows a clear performance advantage, which we don't see today," he added.

Zenith backed its words with action last week, introducing its first EISA-based product, the Z-386/33E. The system, slated to ship this week, is positioned primarily as a file server.

The box's most important differentiation is a patented mass storage controller that reportedly features an average access time of 1 msec — 15 times faster than the access time of standard disk controllers.

Zenith also announced support for Unix — a key cog in Bull's openness strategy. Although the new PC offers a Unix option, Frank seemed less than enthusiastic about the operating system. He predicted that Unix will not supplant DOS and OS/2 as the main operating systems of Zenith's Intel-based product line.

In fact, Frank kicked the Unix ball into Bull's court. "It is not our mission to foster Unix; it is Bull H. N.'s and Bull S. A.'s," he said.

Bull may see net loss in 1989 due to layoffs

NEW YORK — Groupe Bull is facing a probable net loss for 1989 because of charges it is applying for pending layoffs in 1990, said Chairman Francis Lorentz in a conference last week.

"We will continue to speed the trend of reducing our work force," Lorentz said. "We have made a huge provision for layoffs in 1990 that will bring us to a small loss at the net level" in 1989.

Lorentz said that the coming cuts will affect nonmanufacturing workers in the company's home country of France. The cutbacks will not touch new subsidiary Zenith Data Systems, according to Lorentz. "Zenith is in a growing market, so we have to grow it," he said.

Groupe Bull blamed its weak 1989 financials on the industry's growth slowdown, saying "customers were not able to make use of all the products we're supplying to them."

Bull's commitment to open systems also battered its bottom line, Lorentz said, since open systems command lower margins than proprietary ones. But the firm also looks to openness for its salvation in the 1990s. In an effort to streamline its global operations, Bull has reorganized into four separate units, each with its own management and mission. These are U.S.-based Zenith and Bull H. N. Informations Systems, Inc., and French-based Bull S. A. France and Bull International S. A.

Groupe Bull's Lorentz

COMPUTERWORLD

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NEWS SHORTS

SAA-AIX relationship definition due

IBM will detail methods of interoperability between its Systems Application Architecture and AIX operating system within 60 days, according to George Conrades, senior vice-president and general manager of IBM's U.S. Marketing and Services Division. In a speech last week, Conrades also attached the contention held by some analysts that the Open Software Foundation (OSF) has "dumped" AIX. When pressed, Conrades failed to commit IBM's support to the OSF1 operating system, which combines part of AIX with the multiprocessing capabilities of the MACH operating system.

NASA security gap revealed

Hackers have gained access to the Space Physics Analysis Network run by the National Aeronautics and Space Administration (NASA) dozens of times, mostly through user accounts with no password protection or with easily guessed passwords, the U.S. General Accounting Office (GAO) reported. A GAO audit found 67 hacker break-ins between January 1988 and March 1989 but said NASA is beginning to take remedial action.

Singleton promoted to COO

John P. Singleton, head of Security Pacific Corp.'s information systems, was given the additional title of chief operating officer last week in a top management shake-up at the Los Angeles banking giant. Singleton retains his titles of vice-chairman of the corporation and chairman of Security Pacific Automation Corp. Former COO George Moody became vice-chairman of the executive committee as part of a reshuffling in which Richard J. Flamson resigned as CEO and was replaced by Robert H. Smith, president and CEO of Security Pacific National Bank.

Midrange Unix box from CDC base

Control Data Corp. (CDC) last week switched its focus in departmental computing with a line of Unix machines based on technology provided by Mips Computer Systems, Inc. The company, which previously offered departmental systems based on its proprietary NOS/VE operating system, said the new 4000 series of Unix systems will be targeted at CDC's existing user base.

Infonet steps into X.400 world

Infonet last week unveiled its first X.400 messaging product. The initial $350 personal computer-based product, Notice 400 PC, will provide connections and gateways with U.S. and foreign providers of public and private X.400 services as well as with telex and facsimile. In a separate development, Computer Sciences Corp. said it will sell its 30% share of Infonet to MCI Communications Corp. and nine other organizations.

Alliant plans standard tool for RISC

Alliant Computer Systems Corp. last week claimed to be the first minisupercomputer company out of the gate with an open system using a reduced instruction set computing (RISC)-based processor and standard software. The company is using the Intel Corp. i860 64-bit RISC microprocessor. The software, however, is not yet standard. It is based on a proposed technical computer standard called Parallel Architecture Extended, jointly developed by Alliant and Intel. Alliant said the system, with a starting price of $500,000, offers twice the performance of a Digital Equipment Corp. VAX 9000 Model 440.

Chevron places ISDN on hold

Budgetary constraints recently prompted Chevron Information Technology Co. to discontinue, at least temporarily, a pilot test of Integrated Services Digital Network (ISDN). According to supervisor of technology evaluation Steve White, a major reason for Chevron's decision was Northern Telecom, Inc.'s announcement of an ISDN software update that would have required an expensive memory upgrade for its private branch exchanges.

U.S. Memories now just a memory

BY JAMES DALY
CW STAFF

SANTA CLARA, Calif. — The U.S. Memories chip-making consortium died of malnutrition last week, left to wither financially by the industry it hoped to free from a dependence on vital foreign systems components.

The bottom fell out of the ambitious effort to revitalize the domestic dynamic random-access memory (DRAM) chip market at a Dallas conference table a week earlier. During a meeting with 11 potential investors, U.S. Memories President Sanford Kane grudgingly concluded that there was neither enough money nor purchasing commitments available to make the venture worthwhile.

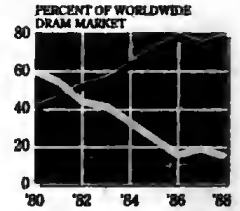
"We had an opportunity as an industry and as a nation to make a statement, and we failed to do so," said a purse-lipped Kane during a press conference announcing the end of the 6-month-old organization. "This does send a strong signal out, but it's not one we can be proud of."

Supporters of U.S. Memories said its death by disinterest bodes ominously for an industry unwilling to come together on vital technological issues. "We are less and less the masters of our own destiny," said Wilfred Corrigan, chairman of the organization and chairman of chip-maker LSI Logic Corp. "Sooner or later, we've got to realize that there is no free lunch."

The seeds for the group were sown in 1988 and early 1989 when Japanese suppliers sharply curtailed exports of DRAMs, which are a key component in electronics goods ranging from computers to weapon systems.

Memory lapse

U.S. industry's share of the DRAM market declined rapidly during the 1980s



SOURCE: DATAQUEST INC. CW CHART: DOREEN HAHLE

Fierce Japanese competition had forced most U.S. companies to flee the market in the early 1980s. Following the shortage, chip prices quadrupled and U.S. firms had to raise prices on memory products and systems or cut back production.

U.S. Memories was conceived to become an instant giant, producing large quantities of 4M-bit DRAMs in an atmosphere unburdened by a preoccupation with short-term earnings goals. Seven investors stepped forward — IBM, Digital Equipment Corp., Hewlett-Packard Co., Intel Corp., National Semiconductor Corp., Advanced Micro Devices, Inc. and LSI Logic — and Kane proudly predicted the venture could produce 50 million chips per year.

However, when DRAM supplies became abundant again in mid-1989 and their price began to fall, interest in U.S. Memories rapidly waned; since its inception, no other companies have joined.

Several firms found their own way out of the DRAM shortage. Sun Microsystems, Inc., which rejected signing on with the group, formed pacts with several international chip makers designed to provide a steady supply of the components, even in a tight market.

As the group's forward motion stalled, Kane scrambled to make it work. An original plan calling for a $500 million investment from computer manufacturers was pared down to $150 million, with other equity to come from outside sources.

Kane also scaled back the number of manufacturing plants from four to one and said investors were committed to buy the U.S. Memories product only if its prices were competitive and the chips met company quality specifications.

Unisys announces low-end entry into imaging market

BY ROSEMARY HAMILTON
CW STAFF

Unisys Corp. will take its second swing at the imaging system market with a low-end system scheduled for announcement today.

The new system is a scaled-down version of Unisys' high-end V series-based imaging system introduced in late 1989. According to a company spokesman, the latest entry can be had for a cost comparable to the IBM Application System/400 Models B50 and B60, in the $60,000 to $70,000 range.

That is a far cry from the $1.5 million entry point for Unisys' first imaging system. When it was announced, industry analysts said the pricing would limit the system's appeal to the company's installed base because non-Unisys users would be unwilling to convert to a new environment for such a high cost. However, the machine could win over non-Unisys customers, analysts said last week.

The new machine is also Unisys' first CMOS implementation of a V series, which has its roots in the old Burroughs Corp. product line. It will be sold for general-purpose computing as well, and a company spokesman said it will reportedly have comparable performance to that of an IBM 4300 series system.

Like the first imaging system, it will be offered to the check processing divisions in banks. In addition, Unisys will stick with its conservative approach to imaging. The first system was not released with an optical disc component, and the low-end version will rely on magnetic, not optical, disk storage.

Firm to resell main memory

The third-party IBM mainframe memory market has few users waiting with open arms.

However, Storage Technology Corp. is going after it anyway.

Last week, the company announced plans to team up with EMC Corp., which introduced central and expanded storage products for IBM mainframes in 1988. An official deal has not been signed, but both parties said they expect it to go through next month. When that happens, Storage Tek will own the exclusive rights to resell the EMC products for both 3090 and 3080-class machines.

"I agree there's a marketing job to be done," said Donald Swatik, a Storage Tek vice-president and program manager.

"But we can leverage the presence we have in the Fortune 500 today. The world is getting accustomed to dealing with us."

Cold shoulder

IBM 3090 customers initially gave EMC — and its chief competitor, Cambex Corp. — the cold shoulder in late 1988 when they launched 3090 memory products. At the time, users said it was too risky to let small third-party companies provide them with such a critical component on their mainframes.

Both companies made some headway in the past year, however. EMC now says its products are installed in 50 3090s.

ROSEMARY HAMILTON

NETWORK DATAMOVER:

THE FIRST REAL BREAKTHROUGH IN FILE TRANSFER.

SYSTEMS CENTER

Morris: Worm program spiraled out of control

BY MICHAEL ALEXANDER
CW STAFF

SYRACUSE, N.Y. — The worm that wiggled its way through the Internet, wildly replicating itself and jamming the memories of thousands of computers, was merely an "experiment" that got out of hand, Robert T. Morris claimed last week.

Morris, 24, on trial on charges of intentionally breaking into federal-interest computers and causing losses of at least $1,000, made his first public comments on the worm program he has been charged with authoring and turning loose on Internet. Testimony in the trial ended last week, and the case will go to the jury following summations scheduled for Monday.

"I wanted to see if I could write a program that would spread as widely as possible on the Internet," Morris told jurors when he took the stand last Thursday. Morris said that he miscalculated the rate at which the worm would multiply and the speed at which it would race through the network when he set it loose on Nov. 2, 1988.

From his terminal at a Cornell University computer science laboratory, where he was enrolled as a Ph.D. candidate, he copied the program to a computer in MIT's Artificial Intelligence Lab in a bid to conceal the worm's origin. At 8 p.m., the worm was on its way from MIT, Morris said.

"Once it started, it did its own thing," Morris said with a wry smile. "It was out of my control."

When Morris returned to the Cornell computer lab three hours later to check on the worm's progress, it was apparent that the experiment had gone awry. In a panic, he made several telephone calls to Paul Graham and Andrew Sudduth, two friends and former classmates, at Harvard University's Aiken Computation Lab, hoping to enlist their help in halting the worm, Morris said. He asked Sudduth, a systems manager, to post an anonymous message on an electronic bulletin board with information on how to kill the worm.

Robert T. Morris *told jury he couldn't stop worm*

"I was scared, and I knew that people would be annoyed by this," Morris said.

Earlier, Sudduth, who testified for the defense, told the jurors that he sent the message but that it did not reach its intended destination until two days later because the system was overloaded.

Prosecution witnesses from the University of Rochester, Purdue University and the National Cancer Institute, among other sites, testified to having suffered about $150,000 in man-hours and lost computer time as a result of the worm.

Computer staffers at the U.S. Army Ballistic Research Laboratory at Aberdeen Proving Ground, Md., were initially concerned that the worm was a "foreign attack" on its systems, said Michael Muuss, leader of the computer systems team. "We have a history of foreign intelligence activity on our systems, and foreign nations take a great deal of interest in the activities of our research scientists."

The weapons research lab disconnected itself from the network for six days while scientists studied a copy of the worm that they had captured, Muuss said.

"We had to certify that no data had been stolen or modified and that the machines were invulnerable to future attacks," Muuss said. As a result, remote users could not access the lab's two Cray Research, Inc. supercomputers, causing it to lose $19,000 it might have earned selling time on the Crays.

The jury will begin deliberations following summations by attorneys on both sides of the case on Monday. If convicted, Morris faces up to five years imprisonment and up to $250,000 in fines. He could also be ordered to make restitutions to those affected by the worm.

Signaling System 7 slip caused snafu

BY ELLIS BOOKER
CW STAFF

Last week's massive long-haul communications outage, first detected by AT&T at 2:25 p.m. Eastern Standard Time (EST) from its network operations center in Bedminster, N.J., affected toll-free 800, business and residential dial-up lines.

Customers of AT&T's Software Defined Network, a virtual private network service that uses AT&T's public switched network, were also affected.

The nine-hour chaos was sparked by an AT&T-developed software upgrade that was supposed to augment its Signaling System 7 (SS7) network. In recent years, long-distance carriers such as AT&T, MCI Communications Corp. and U.S. Sprint Communications Co. and local exchange companies have deployed SS7, an out-of-band signaling mechanism for network control and administration.

One feature of SS7 is that it is supposed to make a network more robust by automatically routing calls around congested or disabled communication paths.

AT&T officials confirmed that the software bug, contained in the C-language SS7 addition, was not discovered during routine laboratory testing before it was installed without incident throughout AT&T's network in December.

Karl Martersteck, vice-president of network development at both AT&T Bell Laboratories and AT&T, said the New York 4ESS switch experienced a minor problem at 2:20 p.m. EST that required it to suspend call processing for a few seconds. "This is a typical maintenance issue, normally not noticed by the calling public," Martersteck said.

Under the signaling plan that glues AT&T's network together, a message was sent over the signaling network informing the other nodes that New York was briefly out of service. In turn, these nodes responded by updating their own software.

"We inadvertently had a flaw in the software," Martersteck said. The flaw "resulted in the signaling processor in the switches receiving this traffic from New York City to be put into a state of confusion."

AT&T has determined that the logic error was triggered when the AT&T 3B2 signaling processor received more than two call setup requests during a window of 1/100th of a second during this condition. "The processor got confused and had to re-initialize," Martersteck said.

As the problem cascaded through AT&T's network, AT&T engineers struggled to understand the mechanism of the problem. However, it was not until the next day that AT&T was able to say with confidence that the event had been caused by an internal error and not a computer worm or virus introduced from the outside.

Rich Thoma, a Philadelphia-based consultant and freelance writer, contributed to this report.

Had to happen

It may be hard for the public to accept, but software-reliability experts say the software glitch that wrecked AT&T's long-distance network was inevitable.

Network switching software, some of the most complex code in the world, typically has about one error for every 1,000 lines of code, according to 1987 congressional testimony by programmers at AT&T Bell Laboratories. Despite extensive testing, many bugs remain undetected until an event (or the interaction of several events) triggers them.

"Nobody in the computer field would be surprised at this kind of incident," said David L. Parnas, professor of computing and information science at Queen's University in Canada. The only unusual thing was the nationwide scope, he said, since minor software glitches often interrupt individual calls.

AT&T Bell Labs, traditionally a leader in software testing and simulation, may have to revise its testing protocols in light of the newfound bug, according to Richard O. Levine, a senior telecommunications consultant at Deloitte & Touche in Washington, D.C.

MITCH BETTS

AT&T

FROM PAGE 1

fire solidified the thinking of telecom managers about the absolute imperative of a variety of carriers," he said. The 1988 fire at an Illinois Bell switching center in Hinsdale, Ill., left tens of thousands of residential and business customers without telecommunications service.

In the wake of the outage, "big companies will reassess the need for an alternative carrier," said Chris Teeter, a manager in the telecommunications consulting practice at Andersen Consulting in Chicago.

However, most businesses contacted last week were in no hurry to condemn AT&T. "If it had been happening to us alone, I'd have been jumping up and down like a crazy man," said William T. Rush, a vice-president of information systems who is responsible for communications at Prudential Insurance Co. in Newark, N.J. Rush's company recently signed a $200 million contract with AT&T.

Rush said Prudential's 800 numbers experienced about 55% to 60% of their projected volume for the day. Internal calls use a nationwide private T1 network and were unaffected, he said.

Like other business users contacted last week, however, Rush said AT&T responded well during the crisis by keeping him abreast of the situation.

Arlington, Va.-based USair, which signed a five-year, $120 million contract in December with AT&T to supply voice and data service to its 11 reservation centers, said its 800 service normally handles 200,000 calls on a Monday. "We were down to half that," said a spokeswoman, who said AT&T worked closely with the company.

John Donovan, assistant vice-president of telecommunications at Aetna Life & Casualty in Hartford, Conn., said his company, which uses MCI Communications Corp. for outbound circuits and gets its inbound 800 service from AT&T, did not receive irate calls from customers on Tuesday. "I can only assume that because we weren't bombarded by calls we were within our tolerance for pain," he said.

They're sorry

On Tuesday, AT&T Chairman Robert Allen apologized for the outage and sought to quell concerns about AT&T's service reliability. "We didn't live up to our own standards of quality," Allen said. "We didn't live up to our customers' standards of quality. It's as simple as that. That's not acceptable to us."

AT&T said it wants to compensate national customers and last week petitioned the Federal Communications Commission for a day of discount calling on Feb. 14, Valentine's Day.

It remains to be seen, however, what lesson AT&T and its two major long-distance competitors, MCI and U.S. Sprint Communications Co., will learn from the episode — specifically, whether some form of coordination between the three could ameliorate a network outage in the future.

For example, AT&T operators on Monday at first refused to provide customers with the access codes needed to reach competing long-distance companies. "It's not normal for competitors to offer their competitors' services, but this is an unusual situation," Allen said. He said, however, that the company may reassess its policy.

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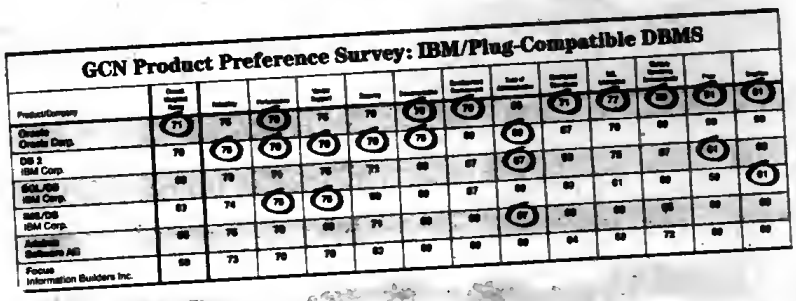

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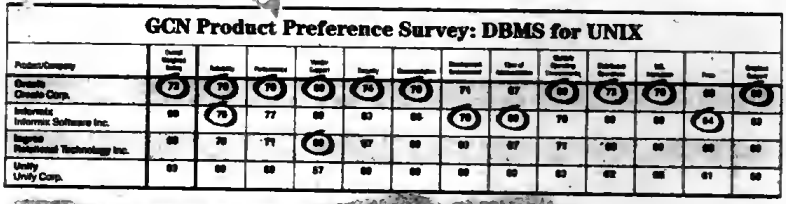

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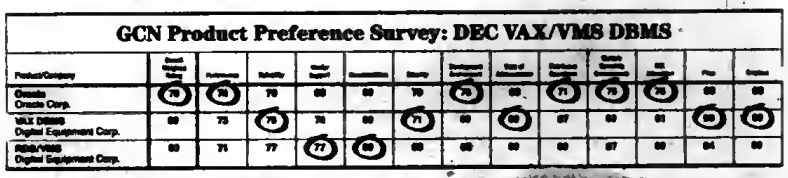

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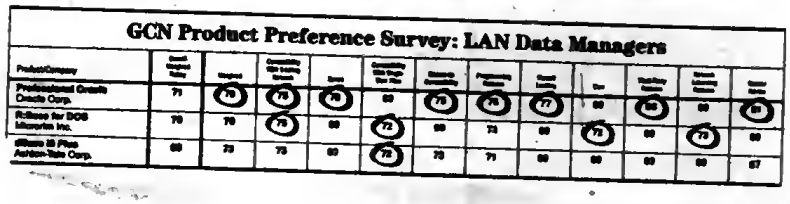

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COMP WORLD

Ontyme users not in the loop?

BY ELISABETH HORWITT
CW STAFF

SAN JOSE, Calif. — A major restructuring and merging of British Telecom, Inc.'s communications service divisions has left some customers in the dark as to how much of their current service and pricing structure they will retain or even who their account representative is.

British Telecom recently began the process of merging the technical and human resources groups of its own Dialcom electronic mail service division with those of Tymnet, a recently acquired company that offers E-mail and value-added networking services as well as packet-switching equipment.

The consolidation into one company, BT Tymnet, Inc., involved eliminating duplicate positions in sales, support and service, resulting in the layoffs of some 240 employees across Dialcom and Tymnet, according to Art Parsons, senior vice-president of marketing and sales at BT-Tymnet. The problem is that BT-Tymnet has not kept all of its customers informed about the planned changes.

David Hill, director of IDG Communications' International News Group, first got wind that something was afoot two weeks ago, when his Tymnet account representative passed on a corporate rumor that the company's E-mail service, Ontyme, was due to be annexed by Dialcom. After spending the last six months working out a new pricing structure as well as improvements for IDG's existing Ontyme system, "this made me spectacularly happy," Hill said sarcastically.

Last week, the representative informed Hill that Tymnet had laid her off, along with the technical consultant that worked with her, "so I have no account representative to call if there is a billing problem or I want to change the system," Hill said. Tymnet has given him no official notification of its amalgamation or layoff plans, he added.

Robert Randall, a current "infrequent" Ontyme user at McDonnell Douglas Corp., also reported that he was getting no word from Tymnet about the proposed merger. "And if I didn't hear, the other users here probably didn't," he said.

In contrast, Dialcom users seemed both more knowledgeable and less troubled by the merger, at least to date. "Obviously, there's a lot of activity going on down there [at Dialcom], but I deal with the same group of people and obtain the same service as before," said Paul Miller, a telecommunications manager at Westinghouse Electric Corp.

At Service Merchandise Co. in Nashville, telecommunications manager Joe Fransino said he had no trouble placing orders at Dialcom last week.

Slipped through the loop

Parsons said that British Telecom notified Dialcom users of the proposed merger but was "unsure whether the same type of notification went out to Ontyme users. If it was overlooked, we apologize." Tymnet hopes within a few days to assign new account representatives to customers who no longer have one, Parsons said.

British Telecom plans to maintain service as usual for current Ontyme and Dialcom users until it finishes merging the two E-mail services into one, Parsons said.

Ontyme users can look forward to accessing features such as facsimile transmission and CCITT X.400 E-mail connections that are currently offered by Dialcom but not by Ontyme, he added. However, both sets of users may have to learn new logon and service access procedures. They may also have to renegotiate their contracts, since Tymnet plans to have a new, consolidated pricing structure by April, Parsons said.

Computerworld West Coast Bureau Chief Jean Bozman contributed to this report.

1-2-3 takes a walk on the Unix side

BY PATRICIA KEEFE
CW STAFF

NEW YORK — Efforts to move Unix onto the corporate desktop gained apparent momentum last week, as Lotus Development Corp. announced stand-alone and networked versions of its 1-2-3 spreadsheet for three Sun Microsystems, Inc. workstations.

The rollout represented the spreadsheet maker's first Unix offerings, as well as its maiden voyage beyond the confines of the personal computer market into work group computing.

Lotus did not mention its forthcoming ports to the IBM mainframe and Digital Equipment Corp. hosts, which were first announced in May 1987 with 1988 delivery dates. Lotus President Jim Manzi has said both products will be delivered in the first half of 1990 [CW, Jan. 8].

Lotus' 1-2-3 is neither the first popular business application nor DOS spreadsheet to be ported to Unix, but it is probably one of the most significant.

Although Sun President Scott McNealy said the introduction "legitimizes" its move to the business sector, both vendors can expect to invest some time introducing their installed base to one another. A limited survey of Sun and Lotus users revealed little overlap and cautious interest.

"My knee-jerk reaction is that a spreadsheet on a Sparcstation is overkill," said Gerald Siddons, director of scientific computing in the Division of Biostatistics and Epidemiology at the Dana Farber Cancer Institute in Boston. He runs spreadsheets on networked PCs and uses Sparcstations for number-crunching statistical work. "I don't think I'd be interested [in 1-2-3 for Sun] off the bat, but I'm willing to be told I'm wrong."

Nor was there any interest in using Sun platforms among Lotus users Sheldon Laube, chief information officer at Price Waterhouse and Steve Rood, a microcomputer manager at Coopers & Lybrand, both in New York.

However, the story is different at brokerage houses that have switched to Sun workstations. "I'm real excited about it," said Richard Niziak, system administrator at Boston-based Fidelity Investments. He currently has about 40 Lotus users on networked Sun workstations. Fidelity uses Sun's Network File System to access about 10 "beefy" Sun boxes that are equipped with PC emulation cards and that store DOS information on 5¼-in. floppies. "Now that Lotus has a Unix product, it will alleviate the need for most of those machines," Niziak said, adding that users could then save money and time.

Analysts said they believe that Sun stands to gain the most from the partnership in the short term but predicted Lotus will collect a handsome payoff in the long run.

Goldman Sachs & Co. analyst Rick Sherlund said it is more important for Sun to get shrink-wrapped popular software for its machines than for Lotus to derive 1% of its revenue from the Sun platform.

The bulk of 1-2-3 for Sun is composed of Lotus' core spreadsheet, 1-2-3 Release 3.0, and features distributed network services, multiple window support, multitasking and support for large amounts of memory. Users will be able to transfer data between DOS and Unix spreadsheets and can view up to 26 spreadsheets at a time.

The software runs on three Sun systems: the Scalable Processor Architecture (Sparc)-based workstations, Motorola, Inc.-based Sun-3 and the Intel Corp.-based Sun 386I.

Announced last summer, the product family and a Datalens toolkit are slated for second-quarter availability along with software drivers for several databases.

"It's clear that [Sun's] mission is to get the major business packages running on the Sun platform," said Nancy McSharry, an analyst at International Data Corp. Sun-compatible Unix ports of some popular databases, desktop publishing and graphics packages also are expected to debut later this year.

McSharry lauded the decision to align pricing for 1-2-3 for Sun with that of MS-DOS programs. A stand-alone copy costs $695. "Workstation software typically costs three to four times that amount," she said.

Uniforum-ity

Wang and Stratus line up in the Unix parade. Page 18.

AT&T buttons up its Tuxedo

BY AMY CORTESE
CW STAFF

AT&T introduced a revamped version of its Tuxedo Transaction Processing System last week, in a bid to make networked transaction processing for Unix systems commercially viable.

Tuxedo is aimed at shoring up Unix's weakness in processing the large volume of transactions critical to many business applications, such as banking and airline reservations where proprietary systems dominate.

Since Unix has only gained the interest of the commercial world in the last few years, tools for transaction processing comparable to those available for proprietary systems — such as IBM's CICS — are limited.

Large-scale forecasts

Industry observers predict that with the advent of multiprocessing reduced instruction set computing machines and mainframe Unix, large-scale Unix transaction processing could become viable within a few years.

AT&T is attempting to speed that progress with its networked transaction processing systems, according to Gig Graham, an analyst at Gartner Group, Inc.

"AT&T is taking a brute-force approach of adding CPUs to solve the problem," Graham said. He cautioned that some of the technology has not been widely adopted and thus is not yet truly tested.

Tuxedo Release 4 is composed of two parts: the System/T transaction manager and the optional System/D database management system. An earlier version was limited to AT&T computers and therefore was primarily used within AT&T.

With Tuxedo Release 4, AT&T has unbundled the offering and enhanced it to support networked, multivendor environments for the first time.

Analysts said that Tuxedo may even be the first transaction processing monitor that spans different vendors' computers and databases.

For instance, Tuxedo reportedly would allow a transaction to talk to a Sybase, Inc. and an Oracle Corp. DBMS residing on two different systems on a network within a single transaction.

The product complies with X/Open Ltd.'s XA interface — a proposed standard interface between DBMS and transaction processing systems that will be formally announced by X/Open at Uniforum this week. Any XA-compliant DBMS could be substituted for System/D, and at least five Unix DBMS vendors are expected to announce support of the interface this week.

However, the XA interface does not address application or remote procedure call issues, essential components of a distributed transaction processing system, said Roy Schulte, program director at Gartner Group.

Tuxedo and the X/Open standard may face some stiff competition. IBM recently formed a cooperative software agreement with Visystems, Inc. to provide the Dallas-based firm's VIS/TP transaction processing system for IBM's AIX platforms.

VIS/TP, modeled after IBM's CICS, may appeal to corporate users who want to move to Unix. It is estimated that CICS applications currently account for roughly 60% of on-line transaction processing applications.

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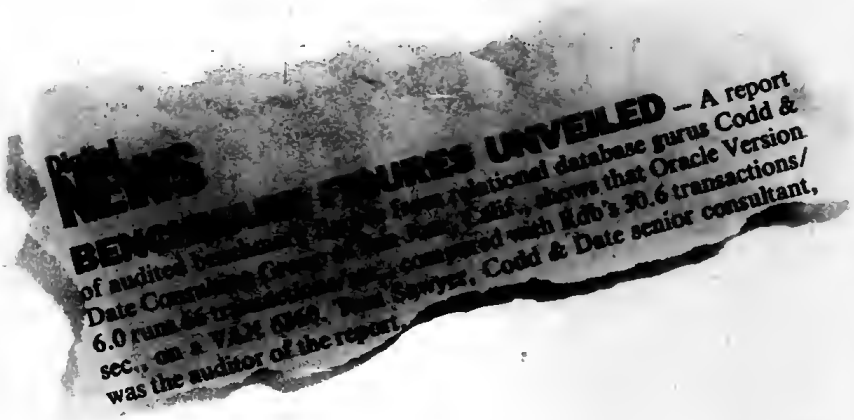

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HP moves to fulfill Openview promise

BY ELISABETH HORWITT
CW STAFF

CUPERTINO, Calif. — Hewlett-Packard Co. last week inked in the details of a 2-year-old promise to provide a standards-based, distributed-yet-integrated network management system.

Providing what may be the first integrated management platform for Transmission Control Protocol/Internet Protocol (TCP/IP) networks, HP announced three Openview components:

- The HPUX-based Network Management Server will implement HP's existing graphics-based, Windows-driven Openview user interface on a distributed platform of multiple servers. It is slated for midyear shipment.
- The Network Node Manager software is said to manage TCP/IP networks. Scheduled to ship by midyear, the software is said to keep track of active and nonactive network nodes by polling both HP and non-HP TCP/IP devices and by communicating directly with systems that support the Simple Network Management Protocol or Common Management Information Service over TCP/IP.
- The systems application is said to consolidate the operation of multiple remote and local HP 3000 hosts under a single Openview workstation and will ship by year's end.

"Using Openview functions to manage our network in its entirety, including HP 3000 system management, would be very interesting to us," said Ray Thomas, manager of office automation at Hadson Corp. in Oklahoma City, Okla. "We have three data centers with each location trying to manage its component as a piece of the entire network, which is difficult without the right tool."

HP claimed that several attributes distinguish the Openview platform from other integrated network management platforms, such as the ability to implement network management functions and information on multiple servers and to make those resources available on a client workstation anywhere on the network. The architecture also includes application programming interfaces and other hooks said to facilitate the integration of SQL-compatible and object-oriented databases, as well as new and existing applications, into the platform, HP said.

While applauding HP's architecture as being solid and well crafted, analysts had reservations about areas of the system that are still missing or unproven.

According to Jeremy Frank, vice-president of Stamford, Conn.-based research firm Gartner Group, Inc., "It's the best deliverable around," but some elements, such as Lanprobe diagnostic tools, need better integration. In addition, HP has yet to announce integration with IBM's Netview, beyond a terminal emulation connection, Frank complained.

Small firm slings trade suit at IBM

BY ELISABETH HORWITT
CW STAFF

A bidding war for Chevron Corp.'s networking business has sparked a legal battle in which Stonehouse & Co., a small, Dallas-based network management software vendor, has sued IBM for allegedly unfair marketing practices.

Stonehouse's suit, filed Jan. 9, charges that four days before responses to Chevron's request for proposals were due, IBM unfairly pressured MCI Communications Corp. to discard Stonehouse's Monies product from its proposal and replace it with IBM's recently announced Callpath voice-management product. Monies is said to manage ordering, inventory, billing and problem administration for voice and data networks.

IBM is alleged to have persuaded MCI to make the substitution by threatening to withdraw its network design component from the bid, "which would have left MCI with no bid at all," Stonehouse President Marshall Roberts said. Stonehouse said it heard of IBM's ploy from someone at MCI, whom Roberts declined to name.

While demanding no recompense from IBM in its suit, Stonehouse is asking for a temporary and permanent injunction against the vendor's "using the market tactics they have been using," Roberts added. "We feel they are using their marketing muscle to force companies like us out of business."

"IBM has looked at the suit and believes it is without merit," an IBM spokesman said. Neither MCI nor Chevron would comment on the suit.

MCI brought IBM in to provide network design, which is "part of the communications service package" that the long-distance carrier has proposed to Chevron, according to Steve White, supervisor of technology evaluation at Chevron Information Technology Co.

Chevron is currently evaluating MCI's proposal against an AT&T Tariff 12 proposal as well as submissions from other companies, whose identities White declined to specify.

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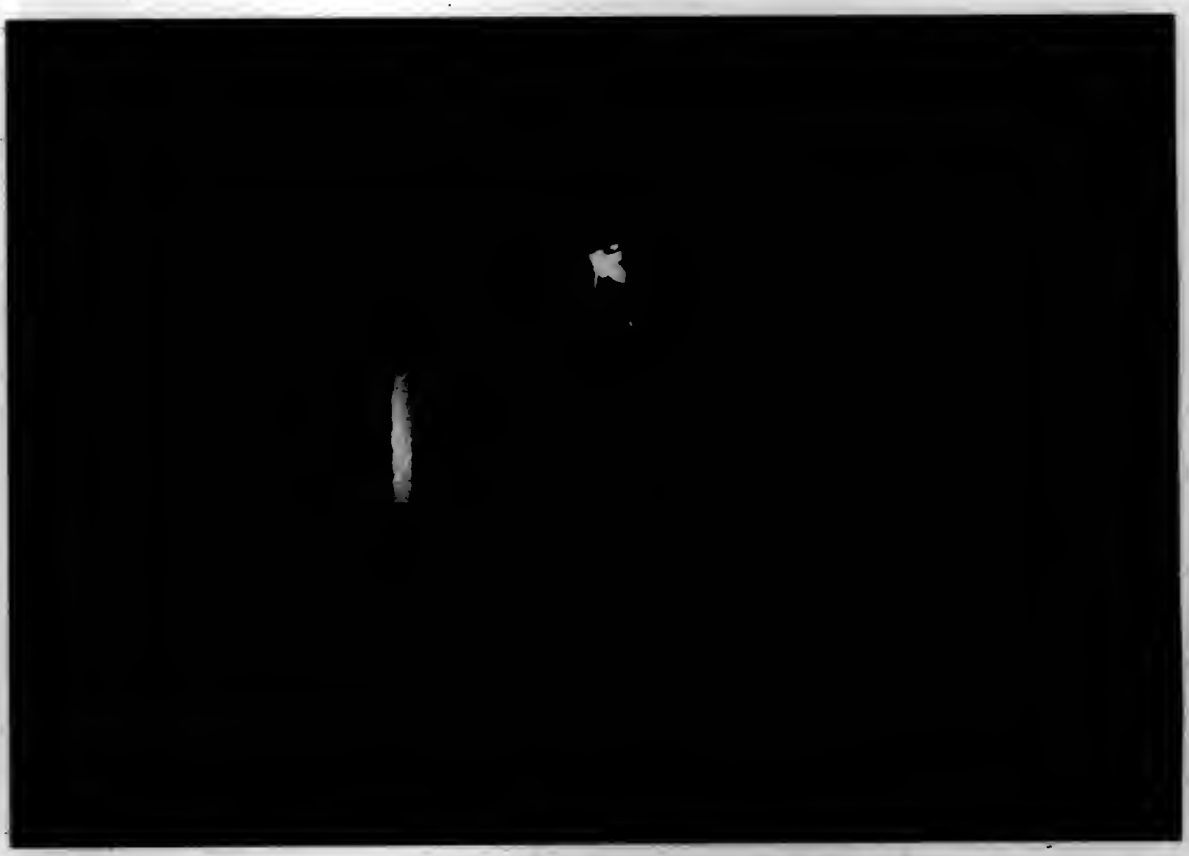

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There is a better way.

HEWLETT PACKARD

Wang, Stratus ready Unix challenges

Uniforum draws Wang's first two eagerly awaited implementations of Intel-based servers

BY MARYFRAN JOHNSON
CW STAFF

Wang Laboratories, Inc. will stage a coming-out party for its first Unix-based hardware and software products at the Uniforum trade show this week in Washington, D.C.

The Lowell, Mass.-based minicomputer vendor will unveil the first two machines in a line of Unix systems built on Intel Corp.'s 80386 and 1486 microprocessors, plus two office software packages.

The two Wang Open/Server midrange systems, priced at $22,690 or $27,690, depending on the processor used, will support up to 128 users.

A neighboring Massachusetts company, Stratus Computer, Inc. in Marlboro, also has a new Unix product to offer. The FTX Unix System V, Release 3.2 operating system will be available this April on the company's entire range of fault-tolerant XA2000 systems. Stratus will package the Unix operating system with the XA2000 systems, which range in price from $37,000 to $750,000.

Wang's new software product, Unix Clearview, provides tools for managing files and applications in a Unix windowing environment. The second product, WP/X, makes Wang's word processing features available to Unix systems users.

The introductions are key elements of a new company strategy called "Innovation on Standards," which describes Wang's direction and marketing plans for Unix and open systems.

"It is vital to Wang's success that they enact their open architecture strategy," said Mike Howard, an analyst at Gartner Group, Inc. in Stamford, Conn. "In the past, Wang was always hesitant to talk about things still in their labs, but with [new Wang President Richard] Miller on board now, they know they have to come out with both guns blasting."

The Unix announcements should be especially welcome in Wang's substantial installed base in the government sector, Howard said: "More and more government requests for proposals are written with Unix in mind."

The base-level Wang Open/Server system includes a 386-based file and application processor with 4M bytes of memory and a 145M-byte disk drive. Optional hardware runs in price from $1,395 for a 25-MHz 80387 math coprocessor to $11,495 for the 1486 upgrade from a 386-based system.

With its Unix announcement, Stratus is splitting its single product line into two directions — one based on the proprietary VOS operating system and the other on the Unix-based FTX.

Company officials said they intend to capture more territory in the government and telecommunications market with FTX, while holding user ground already gained with proprietary systems in the financial, banking and brokerage markets.

"We see critical on-line transaction processing applications as a market with healthier growth than the broader Unix marketplace," said Stephanie Smith, director of product marketing at Stratus.

FTX will support six different communications standards and will run third-party relational database management systems from Oracle Corp. and Informix Corp. Stratus officials said the operating system will be crash-proofed through enhanced software resiliency features in the Unix kernel and extensions to the Berkeley Software Distribution Unix, such as the Fast File System.

The company is also working independently and in conjunction with AT&T to develop FTX-based Integrated Services Digital Network interfaces for intelligent telecommunications network services.

UK health firm likes Wang image

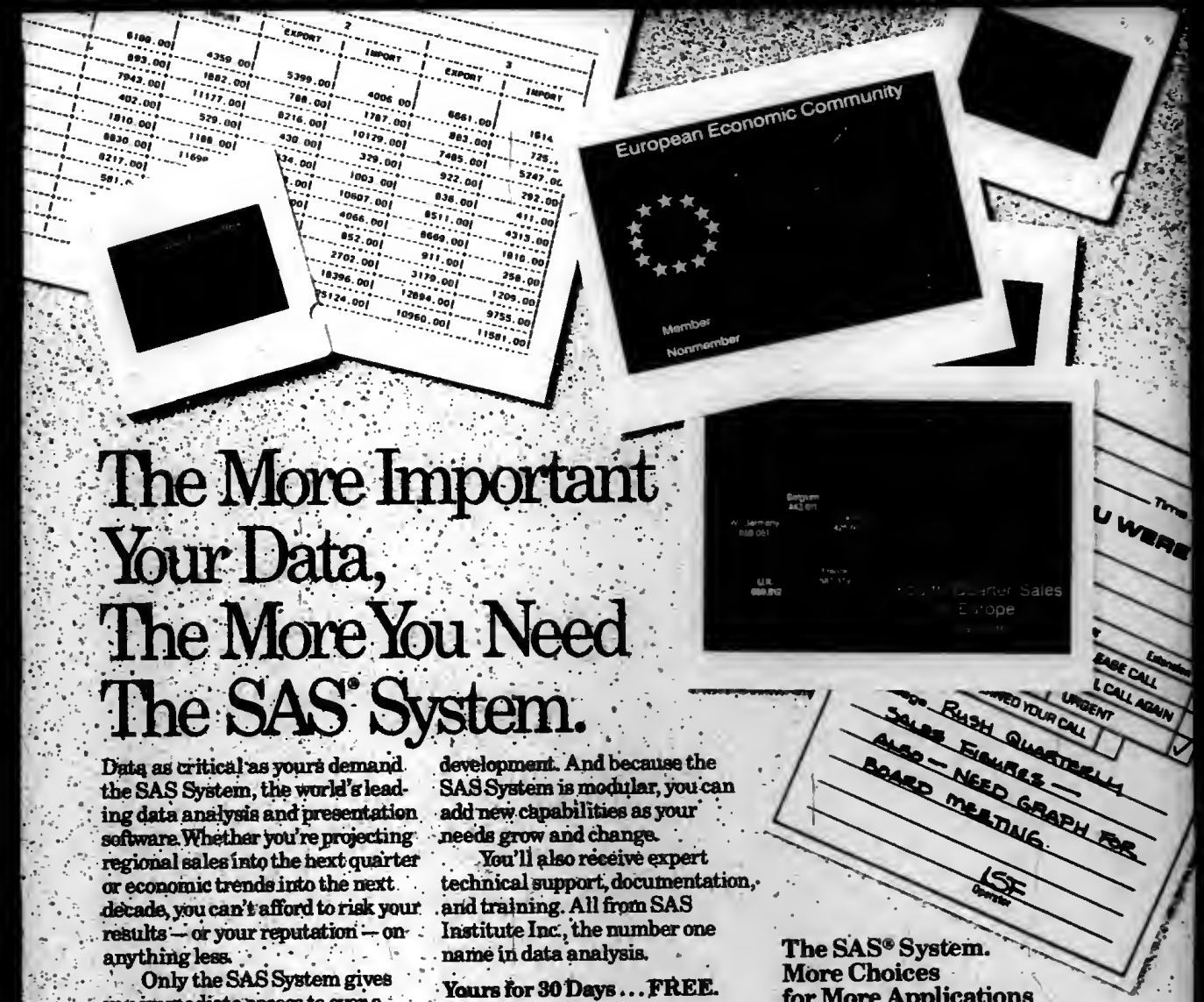
Great Britain's third-largest private health insurer is turning away from its Bull H. N. Information Systems, Inc. data processing systems and toward Wang Laboratories, Inc.'s new imaging systems to stem the notorious tide of paperwork that insurance businesses are forced to confront.

The Western Provident Association in Bristol, England, recently announced a contract worth 1.5 million British pounds for a Wang Integrated Image System.

The system provides tools for capturing, storing, retrieving and distributing documents, which are stored on optical discs.

Western Provident processes approximately 4,000 claims each week, with 1,000 new items entering its mail room per day.

During the next two years, Western Provident will phase out its Bull system and transfer all of its word and data processing to Wang, according to a company official.



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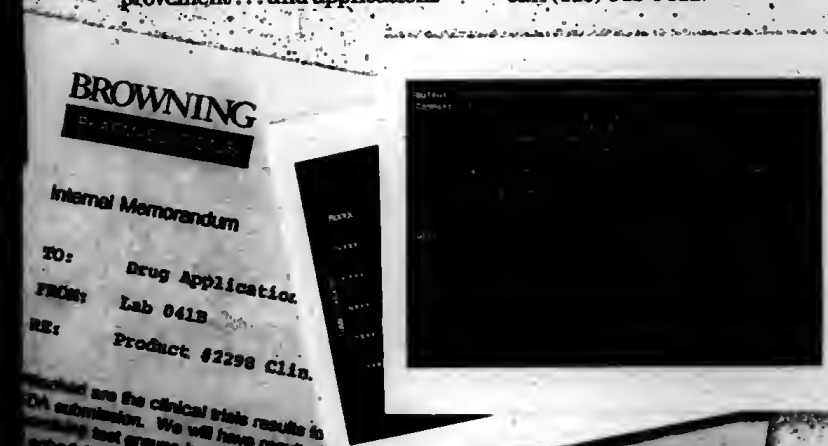

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ADVANCED TECHNOLOGY

Coming to video: Supercomputer I

Parallel processor is designed to give U.S. HDTV engineers a competitive edge

BY MICHAEL ALEXANDER
CW STAFF

There is a lot more to high-definition television, or HDTV, than now meets the eye, and scientists at David Sarnoff Research Center in Princeton, N.J., are counting on the world's first video supercomputer to prove it.

The Princeton Engine, as the supercomputer is called, is the first of a new class of supefcomputers that allow engineers to design HDTV and other video applications in real time. The video supercomputer significantly reduces development time and costs by decreasing or even eliminating the need to create expensive, hand-made prototypes.

"We've been able to reduce development work from weeks to hours," said Curtis Carlson, director of the information systems research laboratory at the famed lab, where videotape recording, the charged-coupled device image sensor, digital video interactive technology and several other technologies were developed.

The Princeton Engine is a massively parallel single-instruction computer with 1,024 16-bit microprocessors (designed by a team of engineers at Sarnoff). Each of the 1,024 microprocessors is tightly coupled with input and output circuitry to a real-time television signal processor.

According to Sarnoff's researchers, the supercomputer, developed over a period of more than four years, does for circuit designers and electronic systems engineers what computer-aided design systems do for plant engineers. Using a windowing, graphical user interface, engineers make "what-if" calculations by moving, mixing and matching icons that represent components and viewing the results instantly on a high-resolution screen, they said.

ANDY FREEBERG

Flanking the Princeton Engine *are (from left) Curtis Carlson, Danny Chin, Jim Kaba, Joe Passe, Frank Bernard and Herb Taylor*

The research center has constructed two of the supercomputers: one for its own use and the other for Thomson Consumer Electronics, Inc., a European conglomerate that markets consumer electronics here under the RCA Corp. and General Electric Co. brand names.

A third is being built under contract to the Defense Advanced Research Projects Agency. Carlson said the scientists are mulling over the prospect of launching an enterprise to build additional supercomputers.

Proponents of HDTV — which promises to deliver sparkling pictures and compact disc quality sound to TV viewers — contend that America's technological leadership in everything from custom chip design to personal computers hinges on the technology.

"HDTV will have a pervasive reach because images are our most important way of looking at information, and because it requires massive amounts of processing power and memory, it will dominate everything in computing," Carlson said.

Scientists at Sarnoff and other top research centers throughout the country are racing to develop applications based on HDTV technology because the development work can also be applied to a variety of other emerging technologies in multimedia applications, electronic video mail and teleconferencing, medical imaging, desktop video production, weather reporting and more.

HDTV has already been launched in Japan, and a broadcast system is nearing completion in Europe. But concern that the Japanese will dominate the HDTV market here just as they control most areas of consumer electronics has some industry leaders worried. To cede HDTV to the Japanese, they argue, means also giving up in personal computers, custom chip development and other areas.

Molecules light up path to enhanced optical storage

BY MICHAEL ALEXANDER
CW STAFF

Does anyone really want to know that the Internal Revenue Service is looking into new technologies that will make it easier to store tax records and retrieve information come tax reporting time?

Probably not, but researchers at the Department of Energy's Oak Ridge National Laboratory (ORNL) said they have come up with a way to cram more data onto optical discs — a technology that the IRS, among others, is particularly interested in, they said.

The new optical data storage method would enable the IRS to store a year's worth of completed tax returns using just half of the available storage space on a 12-in. optical disc. It now takes 150,000 reel-to-reel 9-track tapes to store an equivalent amount of information, according to Guven Yalcintas, director of technology applications at ORNL.

In addition to packing more data onto a disc, the technology, developed by Tuan Vo-Dinh, a scientist in the health and safety research division of ORNL, can also be used to devise discs with security features that would make them difficult to read or copy without authorization.

The research lab's technology, called Surface-Enhanced Raman Optical Data Storage (SERODS), is based on the principle that the enhanced light-emitting properties of molecules embedded in an optical medium can be altered to store information. When they are close to a rough metal surface, certain molecules emit a strongly enhanced light, called Raman light, which is a characteristic of their vibrations. This emission is called the surface-enhanced Raman scattering effect.

Conventional optical discs store data in the form of microscopic pits that have been burned by laser into a reflective aluminum disc. In playback, another type of laser reads the stored data by distinguishing between the laser light scattered by the pits and that which is reflected by the areas between them.

BILL NORRIS

Oak Ridge's Vo-Dinh

A SERODS optical disc contains a substrate of silver-coated microparticles and an "optical layer." Currently, the optical layer is being constructed of silver molecules, but other materials may be used in the future. Like standard optical discs, SERODS discs are recorded and played back by lasers.

The interactions between optical-layer molecules and the substrate are modified by the laser, changing their light-emitting properties, so that they are encoded to store information as bits. A laser and signal detector, tuned to the frequency of the Raman emissions, are used to retrieve the stored information.

Theoretically, the SERODS storage technology could be used to make discs or even three-dimensional blocks of transparent material with 10,000 times more capacity than current optical discs, researchers said.

Sensitive or classified data can be stored on the disc and protected from snoops because they would have to be able to tune the detector to the exact frequencies of the Raman emissions.

ORNL has filed for a patent on the technology but does not intend to take it to the prototype stage. Instead, the government-funded lab intends to license it to commercial vendors for use in a variety of ways, according to Yalcintas.

For example, a motion picture studio is looking at the technology as a storage medium for rental movies.

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EDITORIAL

Pollster pabulum

WE ARE BEING market-researched to death. More than ever, those who work in information systems are being counted, polled, profiled, abstracted, grouped and dispersed. Buying plans are being dissected, analyzed and projected out to the 21st century. Every emerging trend is seized and put under some kind of industry microscope. But are we seeing the real picture?

Research has been the hidden boom market of the past decade. Not long ago, you could count the number of computer industry research firms on one hand. Our files now bulge with information from more than 100 organizations that forecast trends or maintain buyer databases. And that doesn't count the dozens of one-time surveys that professional societies and businesses conduct or the proprietary work of other industry publications.

While exceedingly useful and important, a lot of this research is also rather suspect. It's unavoidable that when bad research is translated into percentages and spiffed up with bar graphs, it looks the same as good research. Some vendors and PR firms have discovered that they can gain quick exposure by piecing together a quick survey or publishing their own statistics. It's best not to talk about how they arrived at the numbers — you wouldn't want to spoil a good thing.

An official at one respected researcher in the IS field recently admitted that the firm sometimes publishes results of mail-in surveys with a response rate as low as 1%. Survey experts generally cringe at rates of less than 30%. Another well-known research firm is prone to publishing survey results based on as few as 35 interviews. The statistical margin of error in a survey of such a small group can exceed plus or minus 15%.

The latest craze is the "instant survey," whereby magazine readers or television viewers are asked to call a 900 number or fax a printed form to the researcher for quick tabulation. Jacob Ludwig, chief methodologist at The Gallup Organization, Inc., calls such surveys "the research equivalent of malpractice." At best, the results represent the opinions of those who care enough about a topic to fill out a form and fax it.

This is not to cast aspersions on reputable market research or doubt the integrity of the many organizations that do it well. But it is yet another caution for the buyer to beware. Corporate management is increasingly demanding that IS organizations justify their decisions with relevant data. Vendors and industry journals are competing for your attention by presenting data that reflects their view of the world. A clash is inevitable, and the big loser will be the one who makes a decision based on spurious information.

We will redouble our efforts to publish research of the highest quality and to apply high standards to the surveys we conduct ourselves. And we hope our readers will cast a critical eye on all the numbers they read. If a researcher won't tell you how he got his results, there's probably a good reason.

LETTERS TO THE EDITOR

Hacker attackers

The fact that there were so many negative letters seems to indicate that "The hacker as scapegoat" [CW, Oct. 23] does have a place in industry journals and news publications. The very fact that the individuals took the time to write letters in protest indicates that Levy struck a raw nerve. If there is anything that needs controversy (to spice up reading) it is computer magazines and newsletters. Questions about ethics should be a central part of any good publication — especially in heavy technical areas. It is too easy to forget about the ethical aspects of science and to excuse nonethical behavior. The Levy article is a good example. Keep up the good work.

Dr. Leland Gilsen
Archeologist
Department of Transportation
Salem, Ore.

Catalytic system

"Rank and file" [CW, Nov. 6] was right on target. One tool for producing a skilled cadre of "privates and corporals" is the interactive multimedia computer-based teaching system.

Such a system can serve as the catalyst for revamping our public school systems and make the learning process fun for both students and teachers. What a potential for a public/private sector initiative!

John Lister
New York

Mouse that roared

Your article "Microsoft squeaks out an enhanced self-tracking mouse" [CW, Oct. 16] reminded me of the old Warner Brothers' cartoon in which the child prodigy who is not satisfied in building a better mousetrap decides to build himself a better mouse as well. Once again, life imitates art.

Philip B. Wettersten
Chillicothe, Ohio

IS-man cometh

Regarding "A business manager should head corporate IS" [*Computerworld Focus on Integration*, Nov. 6, 1989], information systems are thought of as a technical function along with the people that work in the IS area. The fact is that the business managers in most companies do not understand or support the necessary IS department functions.

The true IS professional is always aware of the corporate goals and how to achieve them. The IS professional plans, budgets, schedules and monitors activities while using technology to satisfy corporate goals economically. The IS professional attempts to highlight the interdependencies between functional areas of a corporation and fosters the concept of data sharing — the concept business managers resist the most.

The truth is, however, little knowledge of IS can be deadly when you are in charge of the IS function. A knowledge of the business coupled with good information engineering skills makes the best leader of corporate IS.

When this is understood, only then will the IS function be used to provide corporations with the competitive edge necessary for them to keep their businesses alive.

John C. Aruanno
Manager of Data Resources
The Long Island Rail Road
Jamaica, New York

Testing, testing

There are three items regarding test-coverage analyzers that I would like to add to Bob Stahl's excellent article on software testing tools entitled "Packing your testing tool box" [CW, Oct. 9].

The first is to point out that test-coverage analyzers have been available free, or at low cost, from the National Bureau of Standards. They also may sometimes be obtained from computer vendors' users' groups.

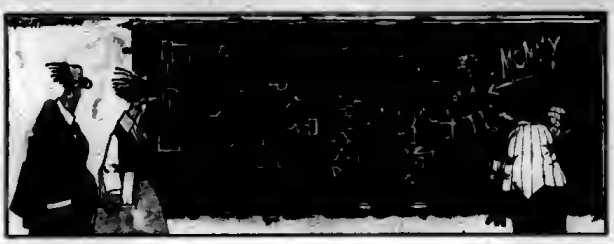
Second, the execution overhead for the instrumented programs typically has been well under 5%. Since the data volume and test time are usually low during the unit test phase (the period in which the test-coverage analyzer becomes the most useful), a 5% overhead during a 10-second test becomes negligible indeed.

Third, 100% test coverage can be easily obtained by modifying the instrumented source code to force execution of the pathological segments that cannot be triggered easily by input data.

What a marvelous piece of work a test-coverage analyzer is: The tool operates at virtually no cost, has almost no overhead and provides a profile of 100% of the program statements and branches!

Ralph J. Mintel
Seattle, Wash.

Computerworld *welcomes comments from its readers. Letters may be edited for brevity and clarity and should be addressed to Bill Laberis, Editor,* Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701.*



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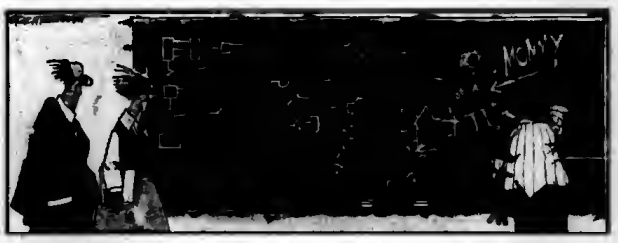

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Who worries about your data?

DENNIS NOONAN

What does a billion-dollar, Silicon Valley computer manufacturer have in common with a now defunct contemporary furniture chain? The answer is that they both publicly blamed their information systems departments for disastrous fiscal results.

Sun Microsystems, the high-flying workstation manufacturer, raised industry eyebrows last summer when it reported its first quarterly loss. Sun said that a major reason for this loss was the inability of the company's IS system to handle the introduction of a new product line.

Earlier in the year, Scandinavian Design, a successful furniture chain in the Northeast, was in the midst of a growth spurt when it went out of business. The firm blamed a new, poorly implemented computer system for its financial difficulties.

These IS nightmares may become more common in the future as the general dependence on distributed processing increases and information needs become more complex. Incredibly, the failures cited above can be traced to the inability of those systems to process elementary (but vital) business information.

Noonan is a free-lance writer based in Wellesley, Mass.

No one would argue with the assertion that data assets need to be controlled like any other property of a firm. Why, then, do so many firms provide only half-hearted enforcement of procedures to control the development and use of these resources?

Managing data assets is the key to useful business information and ultimately defines the success of the enterprise. Yet managers often focus on the goals they are trying to achieve and don't stop to think about the resources they are working with. They assume the data in their files is fact. We all know what happens when we assume.

Data assets are defined as knowledge in the form of files, reports, programs and records. Today, most data can be stored on magnetic media such as voice, data, graphic and multisensory combinations. People tend to trust computer data more than information scribbled on a piece of paper.

However, a handwritten error will usually remain harmlessly filed in a dusty file cabinet, whereas a magnetically encoded error can replicate itself endlessly. Information is power, and anyone with a personal computer on his desk has the capability to generate huge amounts of information in the form of graphs, spreadsheets and formats.

The recipient of such information has two choices: a) Spend the time and effort to validate the accuracy of the information. b) Accept the accuracy of the information. In a busy environment, the latter choice is generally the only reasonable path.

I believe that this data management function is the "missing department" in most firms. Departmental users do not have a cross-functional responsibility for information. They depend on the central IS function to police data management practices. However, IS people are concerned with data *format* not *content*.

In a centralized IS organization, computer operations are usually well controlled. However, this control is focused on meeting the structural needs of systems. Systems analysts will assert that "users are responsible for accuracy." Thus, in effect, *no one has the responsibility.*

So there is a gap in the organizational structure. What is needed is a group that worries about data accuracy. I call it data management.

CHRIS DEMAREST

At a billion-dollar minicomputer manufacturer, this function was created within the product marketing group when it became clear that the traditional process was not working. Marketing managers were chartered to analyze hot trends, competition and profitability; set pricing; and communicate new product information to a worldwide organization.

A major problem they encountered was that someone else was always dictating the schedule and quality of available data. Financial analysts controlled cost and profit data; IS programmed and generated analysis reports. Corporate communications wrote the announcement documents, and sales administration maintained the product/price files.

The new data management group was created to pull together all the data assets needed by marketing management. Without a net increase in overall head count, the group was able to concentrate on product-related data and integrate it into the systems and procedures of the marketing organization. The result was higher quality information with rapid turnaround and more effective use of resources.

Success invites competition. Eventually, the strategy of a successful company must involve marketing plans to gain (or keep) the edge over competition. Often, successful young enterprises may not perceive the value of their own information assets. They are then forced to buy information about the marketplace from an outside source, with no guarantee of accuracy.

It would serve these firms well to create an awareness and chartered responsibility for managing their own data assets. In fact, data management can make the difference between high-flier and flop.

IBM's not-so-free market: Windows users feeling Blue

AMY WOHL

On Nov. 13, IBM and Microsoft signed an unexpected truce that left many software developers and users confused and unhappy.

In return for a limited endorsement of Microsoft's Windows as a Systems Application Architecture user interface on a narrow range of personal computers, Microsoft agreed to cap future Windows plans.

Specifically, the following points were detailed:

- There will be no server version of Windows. This lets IBM win a little. You'll have to buy at least one PC big enough to load and run OS/2-Presentation Manager for each local-area network environment. This victory is reinforced by IBM and Microsoft's decision to merge LAN Server and LAN Manager, which in itself was a very good decision.
- Future versions of Windows may not include high-end features of OS/2. This means OS/2-Presentation Manager will be and will remain superior to Windows. That's no surprise. The shocker is that Microsoft has given up in advance its right to respond to future market demand to enhance Windows should market response turn out to be loud and durable. (And that is exactly what IBM may have been worrying about.)
- Microsoft has promised to ship Presentation Manager versions of its applications ahead of Windows versions of the same applications after mid-1990. Unsaid (but not, we bet, undiscussed) must be a commitment from Microsoft to help get other major developers to do likewise. A few developers, such as Lotus, which had already hoped to ignore the Windows platform and aim straight for Presentation Manager were jubilant at their amazing ability to see the future (or maybe just to guess right).

Other developers, with heavy Windows commitments on the table and, in a few cases, already in the market, were dismayed at what they saw as a betrayal. Microsoft, they said, convinced them to write for the Windows platform, and they made substantial investments. Now they claim Microsoft seems to be saying that the marketing opportunity for these investments (and, therefore, the payback) will be shortened, regardless of the value of their products or their reception in the marketplace.

Particularly grumpy are the developers which believe the hardware platform for Presentation Manager will be slow to grow, creating an enormous opportunity for graphical user interface software for the smaller Windows platform that will now be hard to capitalize on with a limited Windows environment.

The Nov. 13 announcement fiesta included an intention to explore a kind of PM Lite — a slimmed down version of Presentation Manager. But Microsoft is claiming that it only promised to *try* for a smaller version of Presentation Manager. In any case, no one knows whose software would run on a smaller version of Presentation Manager. It wouldn't run Windows software. Whether it would run standard Presentation Manager software remains to be seen. If it doesn't, the prospect of another development platform would be another source of developer grumbling.

Worrywarts

Developers weren't alone in being surprised by the events of Nov. 13. A number of users have already made commitments to Windows as their next software platform. Now they're worried. They're concerned about how many software developers will delay, cancel or never start Windows projects at all.

They're also worried about whether capping the Windows function means that Windows is no longer an adequate platform for even short-to-medium-term deployment. Should they stop in midstep? Then what? Clearly, IBM wants them to consider Presentation Manager, but Presentation Manager with no software is no choice at all.

This brings out the chance of something unpredictable occurring. Maybe the real effect of Nov. 13 won't be to encourage Presentation Manager software development instead of Windows development but rather to force users to see what else is in the marketplace. In that case, there are two other candidates: Unix and Apple's Macintosh.

More importantly, however, users are worried that if a major platform can be announced, selected and then downgraded in importance without regard to customers or market demand, choosing can become a very scary thing.

What should users do?

- Don't panic. Nothing has really changed yet.
- Think more seriously about moving directly to Presentation Manager without a migratory passage through Windows.
- Don't assume Microsoft has had its last say.
- Keep an eye out for wild cards. A huge, durable DOS market and a Microsoft with a lesser commitment to Windows could add up to a market opportunity for some other multitasking enhancer for DOS. (Did I hear someone whisper Quarterdeck?)

Wohl is president of Wohl Associates in Bala Cynwyd, Pa., and editor of "The Wohl Report on End-User Computing" newsletter.

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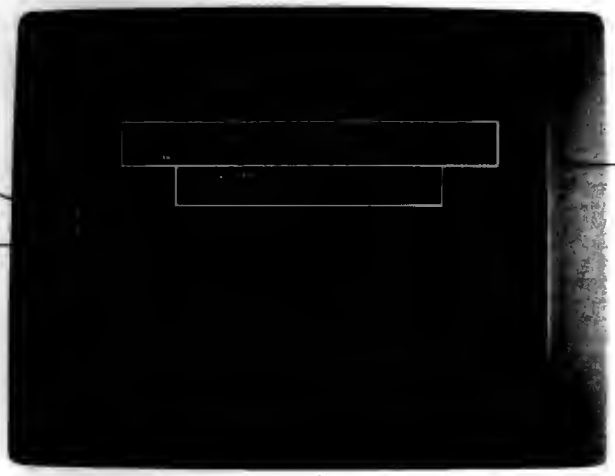

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HARD TALK

Robert Moran

Unix tools: Still waiting

Unix-based computers have broken into big-time commercial processing and have brought their users some big-time concerns.

Applications, and some good ones, can be purchased from any number of Unix vendors and their third-party suppliers. But as users have said in these pages [CW, Jan. 8], Unix users need and want tools that measure performance and consequently enable measure to measure what they have, know how best to use it, and know how and when to justify additional expenditures.

Some vendors are beginning to offer remote terminal emulators — which simulate the work load — but users say that these tools are insufficient. They want a comprehensive tool

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Inside

RADical application building

Tool design and development technique promises major speed advances

ANALYSIS

BY ROBERT MORAN
CW STAFF

Rapid Application Development, or RAD, may be a new buzzword for older commonsense concepts about applications development. But what may help it catch on is the emergence of integrated computer-aided software engineering (CASE) tools.

The method was announced in December by analyst James Martin. It is intended to be a logistical approach combining integrated CASE tools, information engineering methodologies and management techniques to achieve quantum leaps of speed in application design and development.

"We have attempted to define the things that cause significant leaps in productivity," Martin said.

According to Martin, corporations using RAD can experience development speeds of as high as 200 function points per month, a quantum leap above the industry average of about 10 function points per month. A function point is a measure of output based on an application's characteristics rather than lines of code.

According to Martin, RAD tries not only to identify the appropriate CASE products for the individual project but also to deal with organizational issues such as the best methods of managing people, figuring out the right context for a project, the appropriate level of project sponsorship and methods of making sure that the management structure and process does not stand in the way.

"You can cause an expert group of people with good tools and a well-defined project to take 20 times as long as it would," Martin said.

In brief, the method (see chart) calls for bringing together key people within the organization to brainstorm and, through a structural approach, identify the project's needs. That is followed by the development of an initial application and cutting over to production.

However, Shaku Atre, partner and president of Atre Computer Assistance, Inc., said RAD is simply a new name for, or "a dressed up" version of, CASE.

"With this new name, people will again think that if only they buy this thing called RAD they will get productivity improvements," Atre said. She added that CASE users are still in

Continued on page 32

Familiar faces, new setting

Some of the key elements of rapid application development are easily recognized, but their applications are new

Life cycle	Key concepts	Key techniques
Requirements planning ▼ User design ▼ Construction ▼ Cutover	• SWAT team • Prototype • Coordinating model • Metrics • Reusable	• Joint requirements planning • Prototyping • Parallel time box development

SOURCE: JAMES MARTIN ASSOCIATES

IBM midrange beckons for Memorex

BY ROSEMARY HAMILTON
CW STAFF

Although the IBM midrange storage market is considered a tough nut to crack for third-party suppliers, Memorex Telex is going after it anyway with a recently announced challenger to the IBM 9335.

The Memorex Telex 3935, introduced earlier this month and scheduled for shipment next month, will reportedly offer twice the disk capacity in a single rack as the IBM 9335. The storage subsystem is aimed at IBM Application System/400, System/38 and Enterprise System/9370 users.

"IBM's competitors have had a tough time trying to break in," said Dave Andrews, president of ADM, Inc., an AS/400 consulting firm based in Cheshire, Conn. "EMC Corp. has been in for some time. But disk technology is something that IBM is very good at. In the AS/400 market, no one has been able to wrestle away significant market share."

Pack in the bytes

Memorex Telex, however, claims that its disk drive technology will allow users to pack up to 6.8G bytes in a single cabinet. The maximum capacity in a single IBM rack is 3.4G bytes.

According to Jack Keller, midrange disk product manager, the company designed a 62-in. rack that can accommodate two controller units and two full strings of direct-access storage devices, which results in the 6.8G capacity. Users also have the option of buying separate Memorex Telex disk components and installing them in the IBM subsystem storage rack.

The company also claims that other features will bring midrange users large system performance. Those features include a data transfer rate of 3M bytes and an average seek time is 17.5 msec. However, IBM's drive shares the same data transfer rate and its average seek time is 18 msec, according to an IBM spokesman.

The 3935 also comes with an optional cache feature that can hold from 2M bytes to 8M bytes of data.

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Computers work for work clothier

BY MARYFRAN JOHNSON
CW STAFF

NORWELL, Mass. — Walk into any one of Wearguard, Inc.'s 75 stores in 10 Northeastern states and the same no-nonsense, work-a-day merchandise is there: sturdy boots, thermal underwear, rubber-soled shoes and row after row of uniforms.

This is a business with a high-tech heart?

It has to be, said Chief Executive Officer Richard Salem. "The computer is truly the heart of the company here, and the customer is the focus. You can't avoid putting one with the other."

EDWARD SLAVIN

Wearguard's IS chief Seelig: *Bumpy ride is over*

The firm, whose motto is "Clothes That Work Over Time," is really two businesses: a retail chain and a mail-order business that sends out 50 million catalogs per year and delivers up to 65,000 orders weekly.

The core of Wearguard's computer operation is a complex of six Prime Computer, Inc. minicomputers supporting more than 300 desktop workstations, which are linked to the data center via the Network Computing System (NCS) from Hewlett-Packard Co.'s Apollo division. The systems run the Primos and Pick Systems, Inc. Pick operating systems.

Intelligent answers

"NCS has made an enormous difference for us," Salem said. "Here is a company with two million customers, and we have complete purchasing histories on all of them. When a customer calls, we can be interactive, quick in response and really intelligent in answering their questions."

For the past year, the networking system has enabled Wearguard to put order-entry and customer service operations at the fingertips of telephone order-takers through an MS-DOS version of NCS from Obsidian Computer in Cambridge, Mass.

Yet the journey to distributed computing was bumpy for the information services department, said MIS director Charles Seelig.

Three years ago, Seelig launched a project to develop interactive personal computer applications — order-entry programs that would be identical for corporate headquarters and point-of-sale terminals in the retail stores.

"But there was no good way to connect PC applications to the Prime computers for database access," he recalled. The Prime systems nearly ended up on the exit ramp, as the company eyed Digital Equipment Corp. VAX computers for distributed applications. Seelig lost interest in DEC, however, when he discovered that the networking software it proposed to him came from a small, third-party vendor.

Then Prime came through by offering Wearguard a chance to work on a nascent version of NCS. While the bugs were being worked out of the networking system, which was installed a year ago, Seelig developed an interim "roll-your-own" asynchronous network application.

"I had a room full of Prime computers that I had to connect to PCs, and we would have tried to do it with or without industry standards," he said. "The fact that NCS may become one of those standards is just icing on the cake for us."

Wearguard has grown from a mom-and-pop mail-order business founded in 1950 — managed from notes jotted on 3 by 5-in. cards — to become the country's leading supplier of personalized work clothing, with $150 million in annual sales.

"We could not have done it without computerization of marketing, distribution and order-entry systems," said Salem, who came out of Dartmouth University's business school in 1978 with a plan to build his father's company into a direct marketing business through high tech.

"The computer is used so intensively here because the secret of tomorrow's a customer is on today's disk file," the CEO explained. "The machines are used everywhere here in giving feedback to our employees and in monitoring the promises made to customers."

Rapid growth and expansion into retail sales took the company from its old headquarters in Cambridge to a new factory and warehouse complex in Norwell in 1982.

Customer convenience weighs heavily on the corporate mind-set at Wearguard, where a 48-hour turnaround time is the standard promise for orders. A customer can walk into any Wearguard store on Monday, order a uniform with his name stitched over the left-hand shirt pocket and wear it to work that Wednesday.

Wearguard spent roughly $6 million to $7 million in the past few years on its systems and software, Salem said. "It might be more expensive to put PCs at every desk, but the opportunity cost of not putting the right information at every hand is much greater."

"The neat part for me is that this is a low technology business," he added. "What turns me on is putting high technology to work in it."

Imaging may be grease for wheels of justice

ON SITE

BY ROSEMARY HAMILTON
CW STAFF

With nearly 2,000 documents crawling through the system every day, the Brevard County Court System in Florida is like many others in the country: a slave to paperwork.

However, if all goes according to plan, it should be set free by 1993.

That is the target date for the completion of a Nixdorf Computer Corp. imaging system implementation. The project is set to begin this month, and if it is successful, Brevard County will commit to Nixdorf, according to Doug Martin, chief deputy clerk for Brevard County, who is overseeing the imaging system installation.

In the end, Brevard County, which has a population of 400,000 and is supported by 12 branch courthouses, will rely strictly on images in the courtroom to conduct court business.

According to Roger Sullivan, a vice-president at BIS CAP International, Inc., a market research firm in Norwell, Mass., Brevard County is one of the few court systems in the country that has committed to imaging to help solve the paper problem.

"Hopefully, a follow-the-leader type of thing will take place," Sullivan said. "This will help bring it up as a solution to a big problem. [The courts] are all buried in paper."

The goal is to have one Nixdorf Targon/3550, a high-end minicomputer, operating as the imaging system engine at the Brevard County seat in Titusville. The 3550, handling the database of images, which will be

Continued on page 33

Picture perfect

Government leads the field in an analysis of how business sectors are implementing image technology

Percent of installed DIDV Systems (Total: 7,000)	
• Government	46%
• Manufacturing	17%
• Banking and finance	14%
• Transportation	6%
• Information services	6%
• Insurance	5%
• Medical imaging	3%
• Pharmaceuticals	1%
• Utilities	1%
• Others	1%

* Digital document and image automation

Tandem seeks to avoid Unix double fault

BY JEAN S. BOZMAN
CW STAFF

CUPERTINO, Calif. — Tandem Computers, Inc. hopes to turn an early failure into a future success. The company went back to the drawing board to correct operational problems that prevented Tandem's first Unix machine, the discontinued LXN computer, from being fully fault tolerant.

The LXN, which had mirrored disks and battery backup, was not fault tolerant. Now it is gone — Tandem introduced it in 1986 and stopped selling it last year — but not forgotten. "It was a very valuable learning experience for us," conceded Stephen Schmidt, general manager of Tandem's Systems Division. "We discovered that delivering partial fault tolerance isn't delivering fault tolerance at all. Now, there is no single point of failure in our system."

Tandem's Unix machine had to be re-engineered from the ground up — and guided by software that would prevent Unix hesitations from becoming system-stoppers. Market research results showed that users expected Tandem, a vendor of fault-tolerant computers, to offer a fault-tolerant Unix system to match.

The new Integrity S2 Unix system, announced Jan. 8, was designed to cope with Unix hesitations. "There are more than 800 places where Unix panics," explained Barry E. Young, vice-president and general manager of Tandem's Micro Products Division, which built the machine. "To make Unix more fault tolerant, we had to isolate and fix many of them." The fixes do not interfere with standard Unix system calls, he said.

Conflict resolution

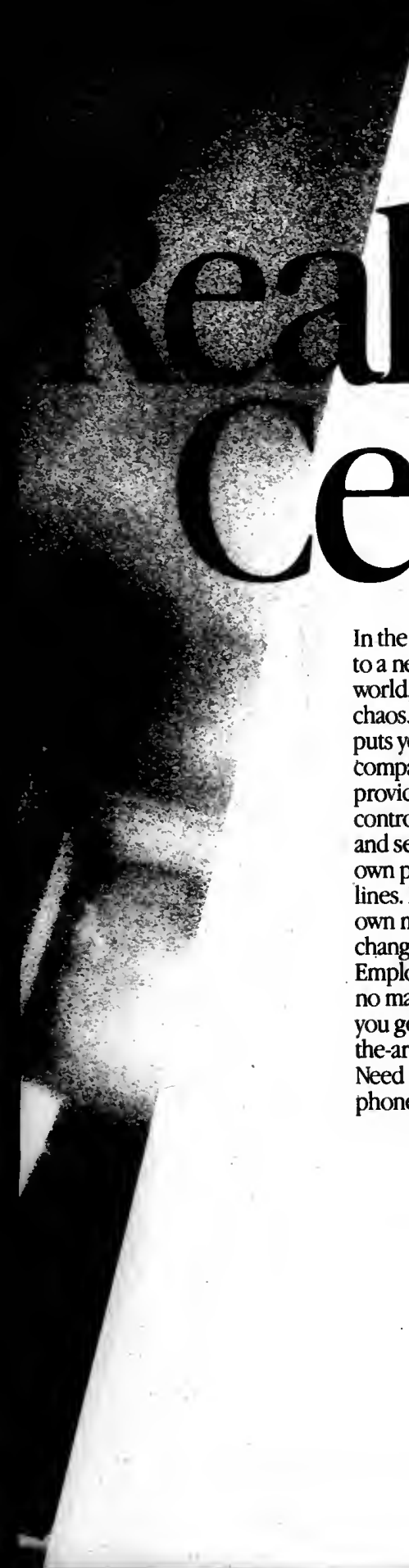
Historically, Unix has tended to deal with conflicting demands for systems resources by shutting down, Young said. "When an application spawns tasks and you run out of memory, typically Unix will go into a panic and stop," he said. "In our system, that task gets turned off, while the rest of the system continues to operate." If a second try at processing the task causes the same problem, the task is set aside for diagnostics.

Integrity S2's proprietary version of the Unix operating system is called Nonstop-UX, but Tandem executives claimed that it can run any Unix applications software that is compliant with the Unix System V Interface Definition. As announced, the Nonstop-UX operating system complies with Unix System V, Release 3. Compliance with Unix System V, Release 4 is expected by early 1991, Tandem said.

The system will run third-party relational database management systems, including those made by Oracle Corp., Ingres Corp. and Informix Corp. Queries to the larger Tandem systems will be carried out through SQL statements to their Nonstop SQL databases.

Integrity S2 is aimed at distributed applications in the telecommunications, retail, financial and manufacturing industries — market segments in which $1.6 billion Tandem has established a foothold with its Nonstop and VLX fault-tolerant computers. The Integrity S2 systems, priced from $172,000 to $248,000, are scheduled for shipment this quarter.

"This machine is everything it's supposed to be," said industry analyst William Easterbrook, a senior vice-president at Kidder, Peabody & Co.



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RAD applications

CONTINUED FROM PAGE 27

search of productivity improvements. "In the first year, you spend more money than you get back," she said.

Martin responded that RAD is more than a redefinition of CASE. "A lot of people are using CASE badly," he said, "and there are many trivial CASE tools out there." The methodology, according to Martin, requires integrated tools that have repositories and that take organizations through planning to code generation. However, he said, even with powerful tools, people are using CASE wrong.

According to Vaughan Merlyn, chairman of CASE Research Corp. in Bellevue, Wash., the RAD methodology is appropriate for many kinds of projects, particularly the new class of strategic applications that require user interactions and therefore must be completed quickly to get users' responses to them. He said that common applications such as accounting would profit little from the method because they are already well defined. "So far we have basically tried to automate the methods of the mid-1960s and early 1970s," Merlyn said. "Now that we have some tools in place we are building new methods, and I believe it is analogous to just-in-time. The smaller you make the lots, the easier you manage quality."

"We have used RAD — or whatever term you want to give to it — on a couple subsets of systems," said John Voss, vice-president of MIS at Huntington Service Co., the information subsidiary of Huntington Bancshares, Inc. in Columbus, Ohio. "You go out and rapidly prototype the system and then come back and take a look at modifications to it."

Although Voss agreed that the RAD methodology offered a commonsense approach, he said it has only been made possible with the debut of integrated CASE tools.

Huntington Service has used the RAD approach along with Texas Instruments, Inc.'s integrated CASE tool, IEF, to work with users in developing specifications for screens on a commercial loan system that the bank tied to its on-line banking systems. Huntington Service worked with the bank's commercial loan group and project team to specify data requirements. "In that case there were about eight prototype transactions in a month," he said. "A more traditional development approach would have required about three times as long."

He said that using IEF and information engineering principles has given Huntington a set of applications that better fit the business. "We have been better able to work with the users to better understand the business problems."

According Michele Poliquin, project manager at Imperial Oil Ltd. in Toronto, using RAD techniques and IEF, his team was able to trim the time it took to build an application for automating Imperial's service stations from 150 work months to 16 months.

The system, which is viewed as a competitive weapon within the organization, was put together quickly at the prompting of upper management. "We had a very hungry user, a senior executive with a clear mandate about cost control."

Moran

CONTINUED FROM PAGE 27

box of analysis software, and they want these tools to come from their hardware vendors, not from third parties.

Fair enough? Perhaps not. Unix users point to the mainstay of commercial computing, IBM's MVS, which they envy for its performance measurement tools. But these tools come from vendors so common in the industry and so rooted in MVS that the term "third party" is rarely associated with them.

I don't think it wise, therefore, to expect the computer vendors to deliver the goods. In addition, the absence of a Unix standard may well retard the vendors of analysis tools from rushing headlong into a business with shaky economics.

What to do in the interim? The answer, perhaps, is some internal innovation and a look to the biggest MVS shops as an exemplar.

When IBM introduced expanded storage with its ESA/370, for example, it dropped a wild card into the laps of its most sophisticated users. With MVS/ESA, performance analysts and tuners grappled with concerns similar to what is besetting Unix users today.

Without tools, they worked with known quantities and extrapolated. IBM users have had to get equally innovative with enhancements to data facilities management software and with DB2.

To be sure, IBM users have had more tools to start with than the Unix user of today. However, that hasn't always been the case when working with an IBM processor. Nevertheless, both IBM and Unix users have much in common, though decidedly, Unix users have more reason to be insecure. Each has made an investment that largely dictates the economics of future decisions.

In common, they also have a similar payoff. Power. As MVS and MVS/ESA users have attested, the software-initiated power in their world has opened opportunities for critical applications.

The future of Unix is less clear. Broken performance barriers notwithstanding, users will be watching for tools to see if they will accept it on the high end.

Moran is *Computerworld's* Mid-Atlantic News Bureau software senior editor.

Imaging

CONTINUED FROM PAGE 29

stored on optical discs, will download court documents nightly to several Targon/3145s, which are low-end Nixdorf minicomputers. The plan now calls for each low-end minicomputer to handle two courthouses. The courthouses will be connected to the main system in Titusville by T1 lines. The low-end mini will hold images for the day's court session. When attorneys enter the courtroom, they will approach a workstation to access court files instead of carting in a briefcase full of documents.

Martin said it has not been determined how many workstations will be used with the system. He said at least four units will be installed in each courtroom so the judge, defense attorney, prosecutor and court clerk have access to images. The clerk will also have a small scanner hooked up to his workstation so new evidence entered during a court session can be immediately entered into the system.

However, there is a lot of work to be done before this happens.

Martin said Brevard County first looked to the idea of an imaging system last year. The main administrative division for the Brevard county seat, located in Titusville, moved to new offices, in part to accommodate the massive amount of court-related files.

"We moved in a year ago, and we estimated that the file room space here would last to the year 2000," Martin said. "Well, it's almost full now."

He said his department considered several imaging system vendors, including Wang Laboratories, Inc. It picked Nixdorf primarily because the county has been using Nixdorf equipment for the administrative side of the court operations since 1977.

"We tried to determine which would be most economical and feasible," Martin said. "With all our data tied into the Nixdorf system, we felt that [the Nixdorf imaging system] would be the most economical."

At the end of 1989, Brevard County agreed to pay $2.5 million for an imaging system package from Nixdorf. However, according to Martin, the agreement calls for several specifications to be met during the pilot project, and if Nixdorf doesn't come through, "we can get out of the contract," Martin said.

Put simply, Nixdorf has to prove that an imaging system can handle a county court system that includes 12 courthouses spread throughout a 72-mile-long area. Brevard County has been bogged down with problems such as coordinating the various courts' activities and keeping track of paperwork as well as moving documents from one location to another.

Specifically, Nixdorf has to show that the system has several capabilities that greatly improve the current situation. For instance, Martin says the main imaging system must provide remote users in the courthouse an access time of no more than 12 seconds. Typically, a courthouse user would be accessing the smaller minicomputer, which would reside at the courthouse or at a nearby one, for documents on a daily basis. But the users will also require documents that are stored on optical discs within the main system in Titusville, and in those cases, they must be retrieved in 12 seconds or less.

Martin said a test system will be going in this month and a pilot project, involving a selected courtroom, should be launched within three weeks after the test system is up and running. He said the goal is to run the pilot project for six months and then expand the number of workstations involved.

Arix enhances supermini I/O

BY JAMES DALY
CW STAFF

SAN JOSE, Calif. — Arix Corp. has beefed up its System 90 family of superminicomputers with three new models that emphasize enhanced I/O throughput in both relational database management systems and communications applications.

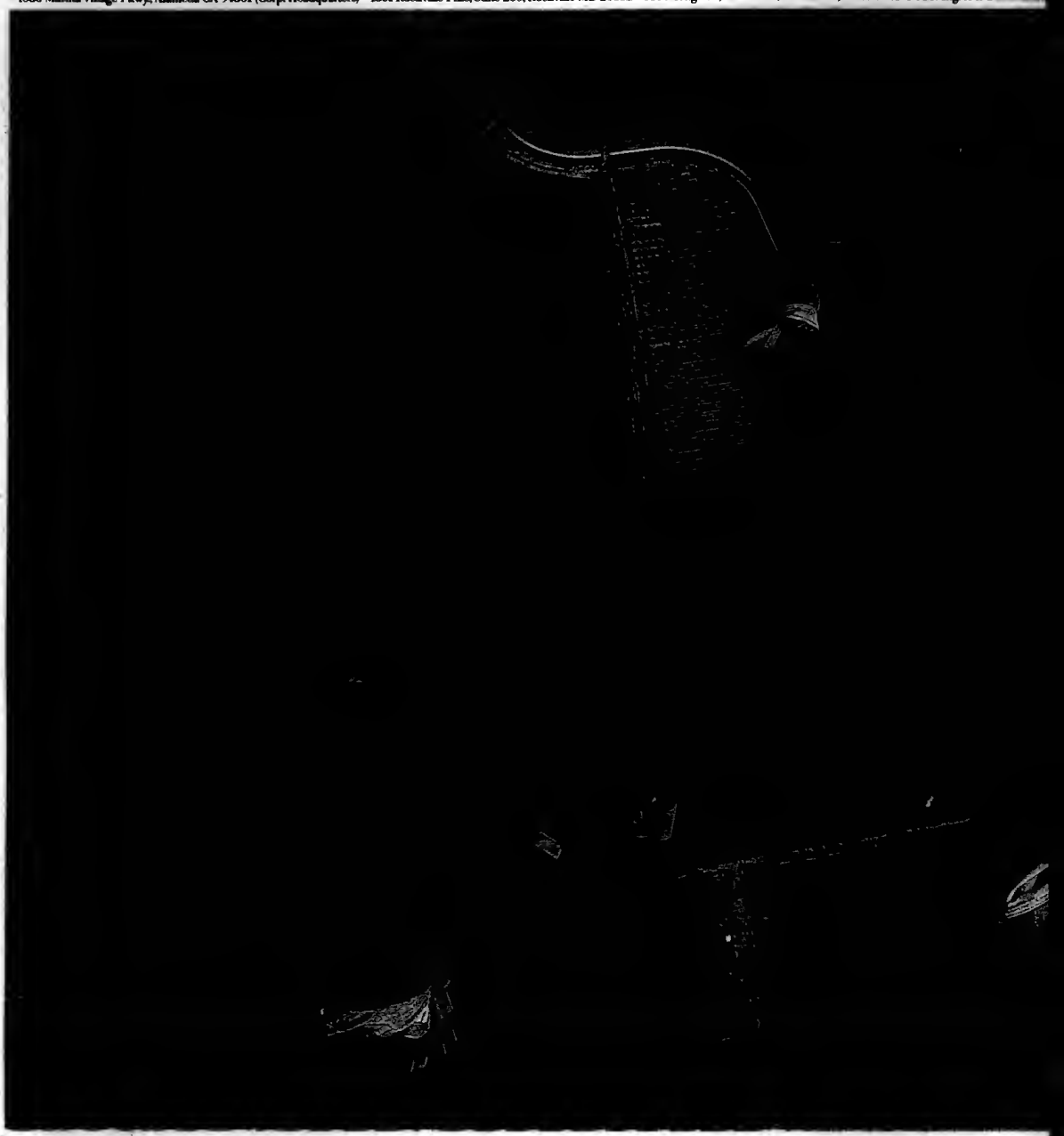
The additions to the 3-month-old Unix-based line target the symmetric multiprocessor machines at high-performance commercial applications and allow the new models to take advantage of advances in power-hungry graphical user interface designs, company officials said.

The Model 90/25 supports from 16 to 128 users, offers up to 160M bytes of memory and can provide more than 5G bytes of disk storage, Arix officials said. The Model 90/45 supports from 128 to 256 users while it offers up to 416M bytes of memory and 63G bytes of storage. The Model 90/85 is designed for between 256 and 512 users, offers up to 416M bytes of memory and provides more that 82G bytes of disk storage.

Pricing for the Model 90/25 and 90/45 will be approximately $52,000 and $128,000, respectively, when they become available in March. The Model 90/85 starts at around $260,000 with deliveries scheduled to begin in June.

The company is also following up the release of the new model with an updated version of its OS/90 operating system.

In a separate company announcement, Arix also revealed that Robert Bartizal has been appointed president and chief operating officer of Arix Computer Corp., a wholly owned subsidiary of the firm.



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NEW PRODUCTS — SOFTWARE

Applications packages

Britz Publishing, Inc. has announced its Personnel Management System for users of IBM's System/36 minicomputers.

Targeted for use by personnel officers, the software provides an on-line, interactive, employee information database. Records may be retrieved by employee name or job title via search and selection routines.

The package costs $395, and RPG II source code is included.

Britz Publishing
P.O. Box 1156
Madison, Miss. 39130
800-255-2028

Utilities

Candle Corp. has enhanced AF/Operator, the automated operations component of its Omegacenter product.

Version 210 provides single-console exception monitoring for multiple systems running under IBM's MVS operating environment. The product offers expanded SYSLOG functions that allow alternate logs for on-line historical data analysis to be created based on user-specified criteria. Cross-reference reporting for automation rules showing specified events, actions and relationships is also provided.

The software costs $26,500.

Candle
1999 Bundy Drive
Los Angeles, Calif. 90025
213-207-1400

A reporting utility that reads standard IBM SMF records and generates data set audit trail reports has been introduced by Cleary Consulting.

The Dataset Audit Facility was developed for the IBM MVS operating environment. Audit trail reports are generated based on user-supplied selection criteria and include data set attributes, data set creation, data set flow analysis at the application or system level and enqueue contention. A yearly site license costs $999.

Cleary Consulting
9254 Flax Place
Riverside, Calif. 92503
714-688-4411

NEW PRODUCTS — SYSTEMS

Data storage

Sony Corporation of America has announced a 12-in., write-once read-many optical disc system with a storage capacity of up to 6.55G bytes per optical cartridge.

The Sony Hi-Capacity system consists of a WDD-600 high-capacity write-once optical drive, a WDM-6DLO CLV Century Media 12-in. optical disc and a WDA-610 multidisc autochanger jukebox. Each jukebox can hold op to 50 optical cartridges, and up to four jukeboxes can be daisy-chained together.

The list price for a single Hi-Capacity drive and controller is $18,000. Disc cartridges cost approximately $360. The jukebox system's pricing begins at $110,000.

Sony
9 W. 57th St.
New York, N.Y. 10019
212-418-9427

A mass data storage system that can store as much as 4.5 terabytes of data has been introduced by Odetics, Inc.

Developed specifically to automate the handling of archival data, the Datatower can be interfaced with mainframe and distributed processing compatibles, as well as with file server networked workstations. It consists of a cassette library and a robotic cassette handling system with options ranging from one to four robotic arms. A typical end-user configuration costs approximately $100,000 and includes the robotic handler, storage bins, a cabinet and an interface. Tape drives are not included.

Odetics
1515 S. Manchester Ave.
Anaheim, Calif. 92802
714-774-5000

IDC WHITE PAPER

Unix - Opening The Door To Business Solutions

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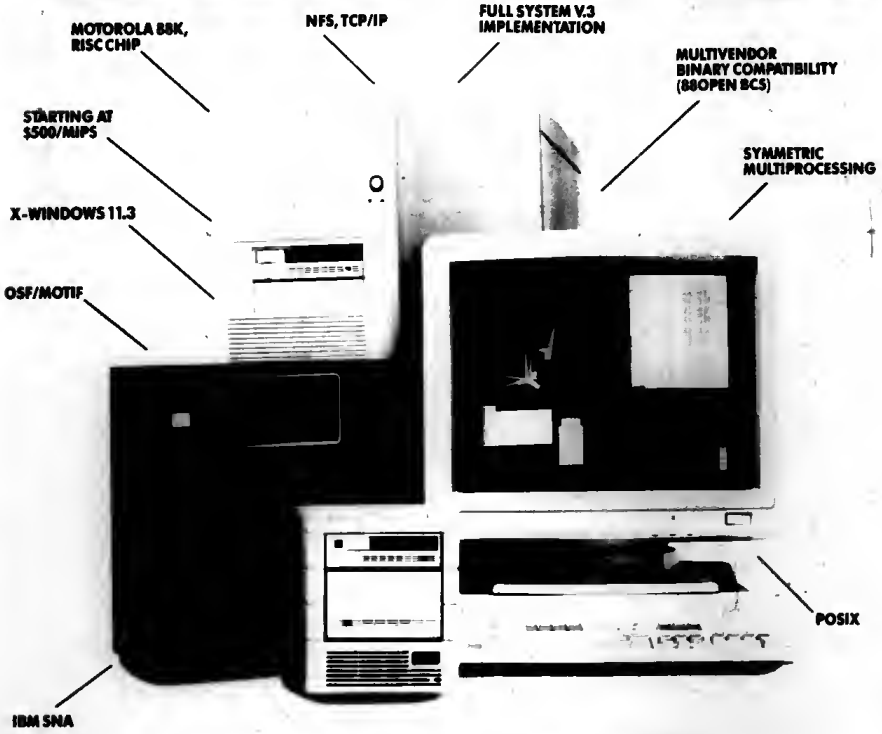

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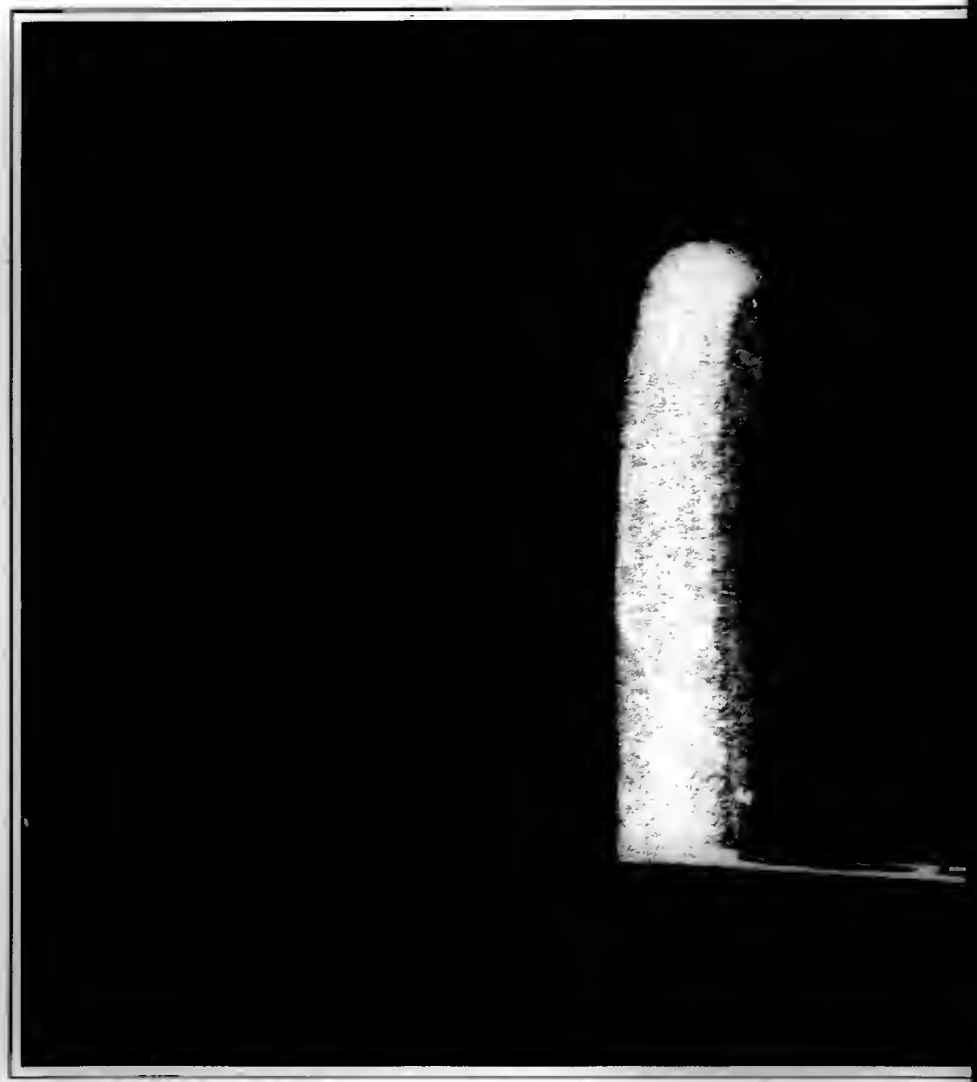
Data General

3400 Computer Drive, Westboro, MA 01580

UNIX - OPENING THE DOOR TO BUSINESS SOLUTIONS

AN IDC WHITE PAPER FOR INFORMATION SYSTEMS MANAGEMENT



UNIX

DESPITE A TROUBLED BEGINNING IN THE 1970s AND '80s, UNIX HAS BECOME A RISING STAR IN THE COMMERCIAL WORLD. INTERNATIONAL DATA CORP. (IDC) EXPECTS THAT UNIX, IBM'S MVS, DIGITAL EQUIPMENT CORP.'S VMS AND MICROSOFT CORP.'S OS/2 WILL BE THE PREDOMINANT OPERATING SYSTEMS FOR COMMERCIAL APPLICATIONS IN THE 1990s. IDC'S SURVEY OF 129 COMMERCIAL COMPUTER SITES CONDUCTED IN THE LAST TWO MONTHS OF 1989 INDICATES THAT UNIX IS USED FOR COMMERCIAL APPLICATIONS AT 84% OF THOSE SITES. AS ILLUSTRATED IN TABLE 1, THESE APPLICATIONS RANGE FROM ON-LINE TRANSACTION PROCESSING (OLTP) TO DESKTOP PUBLISHING TO PROJECT MANAGEMENT.

As a further indication of the commercial world's acceptance of Unix, 70% of MIS managers surveyed stated that they had purchased off-the-shelf, shrink-wrapped Unix solutions for their business problems.

UNIX: NOT JUST A SOFTWARE ISSUE ANYMORE

Though Unix is usually thought to be a software issue, software is only one-half of the picture. In the early '80s, few people would have believed that IBM would be selling a Unix operating system for its mainframes by the end of the decade

As the production of open systems continues, one can expect Unix to shine. All major hardware vendors, including those that have been notoriously closed in the past, have announced versions of Unix for their platforms. Some companies have announced complete hardware lines, such as Data General Corp.'s Aviion and DEC's Decsystem, that will run Unix but will not run their proprietary operating systems. In the 1990s, IDC expects the hardware vendors to play a larger and more supportive role in continuing the Unix revolution.

While workstations and minicomputers were the traditional Unix platforms of the late 1980s, the workstation sector's growth rate has slowed down significantly. This should not be considered a sign of a slowdown of the Unix market but rather an encroachment of microprocessor-based Unix systems. IDC estimates that the growth rate of Unix in 1988, for workstations and minicomputers, was 7% and 10%, respectively. The 1988 market value for the workstation and minicomputer markets was calculated to be $2.2 billion and $1.7 billion, respectively. There is no data yet available for 1989.

With the widespread availability of Intel Corp.'s I386 and I486 microprocessor personal computers, Unix finally has a suitable hardware platform available for the desktop systems. With products such as Santa Cruz Operation's Xenix, the growth rate among Unix PCs in 1988 was 62%, compared with 19% for all PCs. This $3.63 billion market comprised 42% of the $8.53 billion overall Unix market.

As Unix gained commercial acceptance by mainframe users, the Unix mainframe market value growth rate was driven to 30%, generating a $1 billion market. During the same time, the overall mainframe market value grew by only 9%.

In all, the Unix market captured 10% of the 1988 aggregate computer market value The 29% Unix growth rate was significantly higher than the 7% rate turned in by the overall computer market

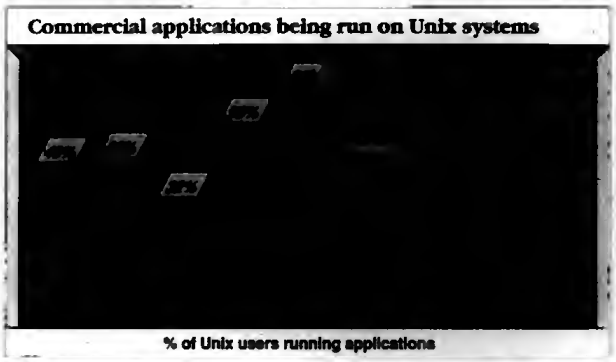


Table 1 Eighty-four percent of the 129 commercial computer sites surveyed by IDC said they are using Unix for commercial applications Mission-critical applications were the most common, followed closely by project management

ISSUES OF 1990s

In order for a company to successfully compete in the 1990s, IDC's ongoing research has identified five areas of concern that must be addressed by the IS manager:

1. The connection and management of distributed data resources.
2. The production of OLTP systems.
3. The identification and development of mission-critical applications (MCAP).
4. The increasing use of executive information systems (EIS) and decision support systems (DSS).
5. The implementation of enterprise solutions and standards (ESS).

Each of the five elements must be successfully managed by the IS manager. The successful IS department of the '90s will need a computer system that does more than solve today's problems; it must be sufficiently flexible to handle problems that have not yet been considered. Of today's widely accepted operating systems, Unix's flexibility is unique in that it does meet the demands of today and tomorrow. Unix will continue to grow in both installed base and market share

For 1988, IDC says personal computers dominated the Unix market in terms of market value and share of market PCs accounted for $3 63 billion in revenues and garnered a 42% market share After PCs, the bigger the machine, the smaller the dollar value and share of market.

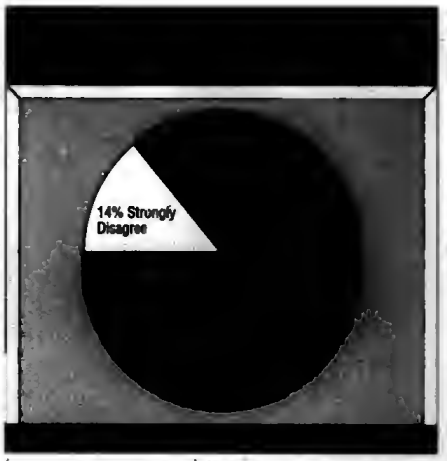
Why Unix?

Although Unix celebrated its 20th anniversary in 1989, the operating system bas only been commercially supported since 1983. Originally developed by AT&T as an interactive, multitasking development system for the experienced programmer, it has evolved into a commercial-strength production operating environment.

Due to its wide availability, Unix became the de facto hardware-independent platform.

Thus, it became the paradigm of federal procurement specifications. Only one of the sites surveyed by IDC, however, indicated that federal specifications influenced their Unix purchase decision

The driving force behind Unix is its ability to run a multitude of platforms. Because the majority of the Unix operating system is written in C, a high-level language, Unix may be ported to other platforms as soon as a C compiler is available for the target computer. Theoretically, it is then possible to take an application that was developed on a Unix microprocessor-based computer and have it run in a Unix supercomputer production environment and vice versa, with just a compile and link of the source code on the new platform.



From its relative seclusion of the 1980s, Unix is poised to take the center stage of the '90s, according to a 50% majority of those polled.

A different Unix for every vendor

Being written in a high-level language is both an advantage and a drawback for Unix. Users who bought the rights to the Unix source code could and did modify its original functionality. Because of the efforts of countless computer science students at institutions such as the University of California at Berkeley, variations of Unix were created and evolved. From the efforts at Berkeley came a succession of Unix versions, the latest being Berkeley 4.3. At the same time, AT&T also continued to enhance its Unix, releasing System V Release 4 in November 1989.

As a result of these two major versions of Unix, AT&T and Sun Microsystems, Inc., a major Unix-based workstation manufacturer, announced that they would jointly develop new versions of System V. Fearing that Sun would have an unfair competitive advantage, the Open Software Foundation (OSF) was created to develop a Unix that would compete with the AT&T/Sun product. The seven original OSF sponsors were Apollo Computer, Inc., DEC, Groupe Bull, Hewlett-Packard Co., IBM, Nixdorf Computer Corp. and Siemens AG. Since its inception, over 150 organizations have joined OSF.

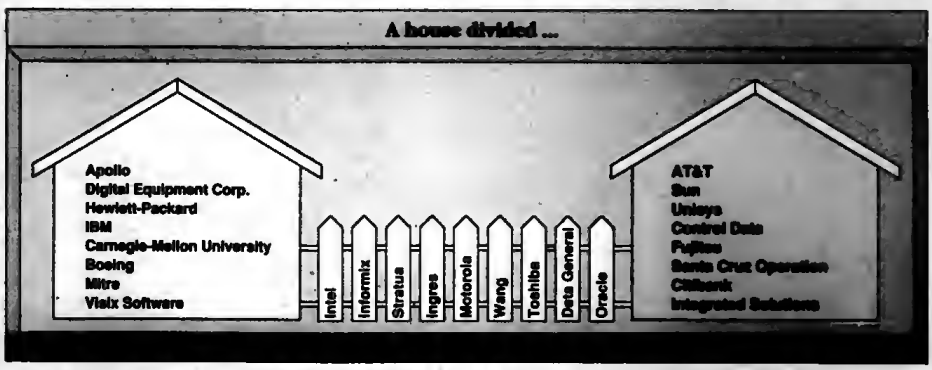
As a response to OSF, Unix International (UI) was then formed to act as an advisory panel in assisting AT&T in the ongoing development of System V. There are more than 100 members of UI, including Amdahl Corp., Control Data Corp., Fujitsu, NCR Corp., NEC, Prime Computer, Inc. and Sun.

Though the founding members of both OSF and UI tended to be primarily hardware vendors, many software vendors and end users have also joined the standards organizations. The addition of the software vendors and end users gives both organizations a well-rounded perspective in generating their final product: a Unix that meets the needs of the hardware manufacturer, the software developer and the end user, not just one special interest group.

Membership in one standards organization does not exclude one from belonging to the other group. Dual membership status is held by such companies as Data General, Motorola and Stratus Computer, Inc. among others.

Are the conflicting standards significantly delaying Unix purchases? When IDC asked this question of IS managers, 68% indicated that the differing standards had little or no effect on their current Unix purchases. However, 25% of those polled stated that the conflicting standards were delaying their Unix acquisitions.

The respondents to IDC's census indicated that they were not really interested in what version of Unix they were running. Regardless of what version of



A house divided: The Open Software Foundation and Unix International both tried to control Unix development. Nine companies made sure that they would be on the winning team by joining both of the competing factions

DEPTH&


Oracle Corporation • Micro Focus Ltd. • Absoft Corp. • Acceir8 Technology Corp. • ACCUCOBOL • Applied Logic Systems, Inc. • B32 Software Ltd. • Basis International • BASIX Development Group • Boston Business Computing • Datavision Ltd. • Diab Data, Inc. • Digital Information Systems • Egan Systems, Inc. • Franz, Inc. • Gensym Corp. • Green Hills Software, Inc. • HCR Corp. • Ibuki, Inc. • Inference Corp. • Interactive Software Engineering, Inc. • InterSystems Corp. • Jyacc, Inc. • Language Processors Inc • Megascore, Inc. • Micronetics Design Corp. • NKR Research, Inc. • Oasys Software Corp. • Quantitetive Technology Corp. • Programmed Intelligence Corp. • SINC, Inc. • Software Systems Design, Inc. • Subject, Wills & Company • Tadpole Technology, Inc. • TeleLOGIC • Tele-Soft • Transoft Limited • UNITECH Software Inc. • Verdix Corp. • Visible Systems Corp. • Wild Hare Computer Systems Inc. • Emerge Systems, Inc. • Industrial Programming, Inc. • JMI Software Consultants, Inc. • Lynx Real-Time Systems, Inc. • FTP Software Inc. • Ready Systems • VMARK Software, Inc. • Cognos, Inc. • Cybertak Software Inc. • Empress Software, Inc. • Progress Software Corp. • INGRES Corp. • Sybase, Inc. • Thoroughbred Division • Unify Corp. • Zortec, Inc. • Novell, Inc. • SAS Institute, Inc. • Technology Concepts, Inc. • Phoenix Technologias Ltd. • Informix Software, Inc. • Ryan-McFarland Corp.
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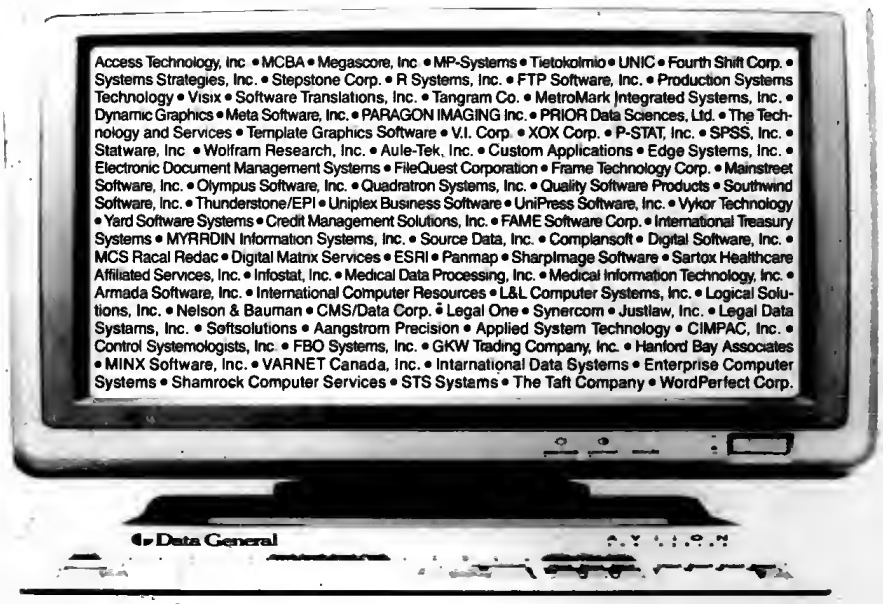

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Unix they are running, IS managers are interested in only one thing: Are there solutions to my business problems on the platform that I have chosen? IDC believes that this will be the trend of the 1990s. Sell me the solution to my problem, then sell me the Unix platform that it can run on.

Distributed Data Resources

Pity the IS manager of the '80s. Yes, the use of his computer has grown. The machine behind the glass wall has burgeoned along with his staff and budget. But as he has looked into the land of the users, he saw them leading a revolution.

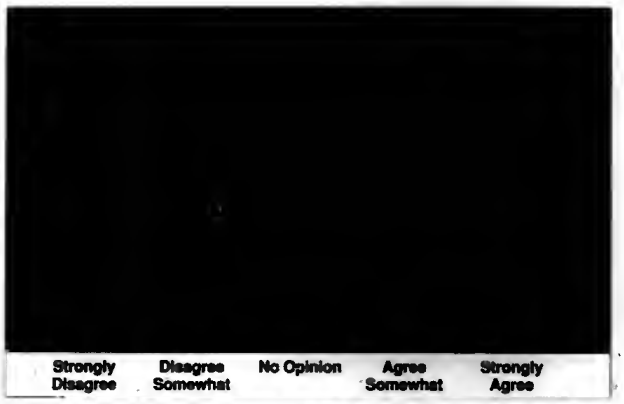
The revolution started 10 years ago, with little fanfare, as one department bought a minicomputer for some esoteric use. The IS department promised a turnaround time measured in months, while the departmental computer was able to deliver in weeks. Then another department bought a couple of personal computers for word processing and something called "spreadsheets." But since he still had a large backlog of programs to develop, the IS manager felt safe in knowing that users would eventually come to him for leadership.

As the decade continued, the departmental minis grew in capability and personal computers multiplied. Some departments went as far as hiring support personnel for their systems and installing networks to allow their PCs to communicate. Managers, particularly those from the finance office, began to notice that there were large quantities of both redundant data and resources being sequestered in each system.

The edict given to the IS manager for the 1990s is "Eliminate the redundancy." He will no longer manage a strictly centralized resource but will incorporate the glass house of his mainframe into the neighborhood of minis and PCs. While doing so, he will need to continue giving the user the power and flexibility he had in the past and refuses to give up.

No man is an island, and neither is the computer in the 1990s. As noted earlier, Unix was designed to be the great communicator. Though its original communications were with users via teletypes, it soon allowed computers to communicate via networking.

In some situations, it may be sufficient only to attach terminals to a host; other situations will demand more complex solutions. A number of workstations may be connected together in a local-area network linking a minicomputer in Hong Kong, which may in turn be connected to a New York-based mainframe via a satellite link. The workstations may be requesting digital information that is stored on both compact-disc read-only memory and conventional magnetic media, and news from live wire feeds. Unix is already in place and successfully handling these situations. IDC expects Unix to support the technologies of the 1990s and carry the commercial world into the future.

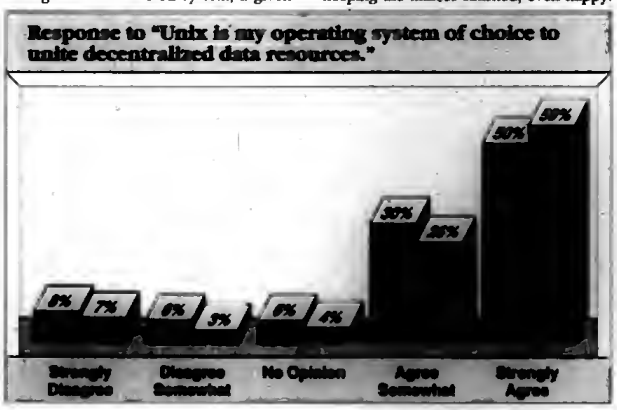


Most potential Unix users are not put off by conflicting Unix standards. More than two-thirds of those surveyed would not let the situation prevent them from purchasing.

From both the end user's and developer's perspective, a networked Unix computer system should appear to be just one machine. Therefore, as in a well-managed nondistributed system, a given piece of data resides in only one location on the Unix network. All applications needing to access the data, for example, a customer profile, will merely reference the data. In the past, each departmental computer would have maintained its own copy of the customer profile. This model would not promote high data integrity, as each system site would be responsible for maintaining the data.

Projections from the glass house

IDC's findings indicate that most keepers of the glass house have found that Unix is keeping the masses satisfied, even happy.



By 1993, almost 90% of those asked expect to implement Unix as the operating system of choice for unifying decentralized resources.

An overwhelming 80% agreed that Unix was their system of choice for unifying decentralized data resources. Only 14% did not. By 1993, 85% expect to be using Unix to tie together assorted data resources.

With the assistance of a little hardware and software, it is usually not too difficult to get computers to communicate with one another on an infrequent basis, as exemplified by the client-server model. On the other hand, it has been extremely difficult to have systems communicate efficiently enough to realize cooperative processing. Cooperative processing is the division of a large program that runs on one processor into subprograms that run on many processors. However, the division of labor requires that the different subprograms be able to communicate quickly and efficiently. Most Unix computers and network systems have been designed with this goal in mind.

Today, there are about the same number of Unix and non-Unix systems running distributed processing applications. MCAPs were the exception in 1989. Of the users running distributed processing MCAPs, only 37% were running them on distributed Unix platforms.

In 1993, IDC does not expect the picture for distributed MCAPs to change significantly. However, Unix-based OLTP distributed systems and EIS distributed systems will lead non-Unix-based distributed systems in market share. IDC expects distributed Unix-based OLTP applications to outpace other distributed OLTP systems by 40%. Though distributed EIS systems will lead by a smaller margin, their 28% lead is still impressive.

Distributed systems have existed for nearly 20 years, but they are difficult, at best, to implement. However, networking is finally coming of age for more and more shops. As Unix - one of the most powerful tools for both development and production of distributed systems - becomes accepted and develops a history with the MIS community, the corporate world can expect to see more cooperative processing systems in production.

ON-LINE TRANSACTION PROCESSING AND THE PROBLEMS IT CREATES

OLTP enables users to process a transaction and receive a response in two to three seconds 100% of the time. Air travelers use OLTP systems every day. The request for flight information, seat selection and payment via a credit card are all transactions that must be accomplished in seconds to satisfy the customer.

On the high end, American Airline's Sabre system routinely completes 2,000 transactions per second across a wide-area network. On the low end, and more typical for most operations, is the point-of-sale terminal. This system can deduct an item from inventory in one transaction and check on the customer's credit line in the next. The OLTP system in this instance may only be asked to complete two or three transactions per minute.

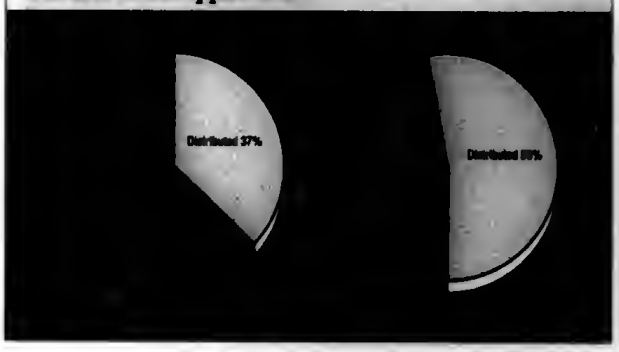
The marriage of OLTP and Unix is not without troubles, but they are capable of being mended by a good marriage counselor, such as an independent software vendor. Though off-the-shelf Unix was not originally designed for transaction processing, both independent vendors and AT&T have been able to offer enhancements to upgrade Unix's OLTP performance.

Buffers for the disk I/O

In the interest of performance, Unix maintains a buffer for disk I/O. The actual I/O to the disk is not performed until the buffer is full. If the buffer is corrupted before the data is written to the disk, the information that the application believes has been written to the disk has not been.

With the release of System V Release 4, write-through buffers are available. A disk

Distributed systems vs. nondistributed systems in Unix mission-critical applications



During 1989, 37% of users running distributed processing MCAPs are expected to do so on distributed Unix platforms, while 53% are expected to do the same by 1993.

System configurations of on-line transaction processing systems

Unix is forging its way into the on-line transaction processing environment. IDC projects a 7% growth spurt from 1989 to 1993.

Unix they are running, IS managers are interested in only one thing. Are there solutions to my business problems on the platform that I have chosen? IDC believes that this will be the trend of the 1990s. Sell me the solution to my problem, then sell me the Unix platform that it can run on.

Distributed Data Resources

Pity the IS manager of the '80s. Yes, the use of his computer has grown. The machine behind the glass wall has burgeoned along with his staff and budget. But as he has looked into the land of the users, he saw them leading a revolution.

The revolution started 10 years ago, with little fanfare, as one department bought a minicomputer for some esoteric use. The IS department promised a turnaround time measured in months, while the departmental computer was able to deliver in weeks. Then another department bought a couple of personal computers for word processing and something called "spreadsheets." But since he still had a large backlog of programs to develop, the IS manager felt safe in knowing that users would eventually come to him for leadership.

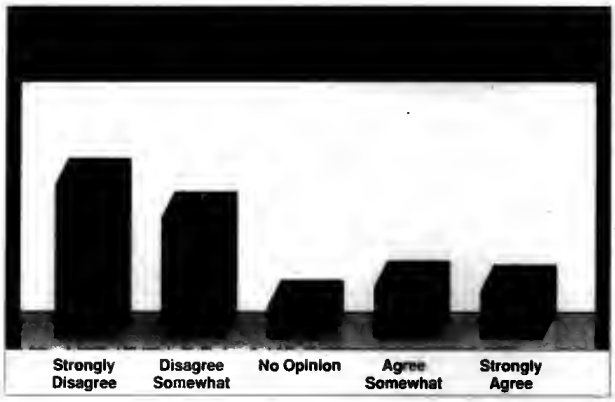
As the decade continued, the departmental minis grew in capability and personal computers multiplied. Some departments went as far as hiring support personnel for their systems and installing networks to allow their PCs to communicate. Managers, particularly those from the finance office, began to notice that there were large quantities of both redundant data and resources being sequestered in each system.

The edict given to the IS manager for the 1990s is "Eliminate the redundancy." He will no longer manage a strictly centralized resource but will incorporate the glass house of his mainframe into the neighborhood of minis and PCs. While doing so, he will need to continue giving the user the power and flexibility he had in the past and refuses to give up.

No man is an island, and neither is the computer in the 1990s. As noted earlier, Unix was designed to be the great communicator. Though its original communications were with users via teletypes, it soon allowed computers to communicate via networking.

In some situations, it may be sufficient only to attach terminals to a host; other situations will demand more complex solutions. A number of workstations may be connected together in a local-area network linking a minicomputer in Hong Kong, which may in turn be connected to a New York-based mainframe via a satellite link. The workstations may be requesting digital information that is stored on both compact-disc read-only memory and conventional magnetic media, and news from live wire feeds. Unix is already in place and successfully handling these situations. IDC expects Unix to support the technologies of the 1990s and carry the commercial world into the future.

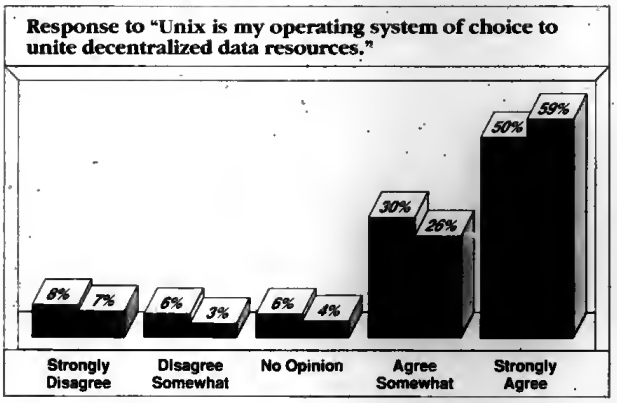
From both the end user's and developer's perspective, a networked Unix computer system should appear to be just one machine. Therefore, as in a well-managed nondistributed system, a given piece of data resides in only one location on the Unix network. All applications needing to access the data, for example, a customer profile, will merely reference the data. In the past, each departmental computer would have maintained its own copy of the customer profile. This model would not promote high data integrity, as each system site would be responsible for maintaining the data.



Most potential Unix users are not put off by conflicting Unix standards. More than two-thirds of those surveyed would not let the situation prevent them from purchasing.

Projections from the glass house

IDC's findings indicate that most keepers of the glass house have found that Unix is keeping the masses satisfied, even happy.



By 1993, almost 90% of those asked expect to implement Unix as the operating system of choice for unifying decentralized resources.

An overwhelming 80% agreed that Unix was their system of choice for unifying decentralized data resources. Only 14% did not. By 1993, 85% expect to be using Unix to tie together assorted data resources.

With the assistance of a little hardware and software, it is usually not too difficult to get computers to communicate with one another on an infrequent basis, as exemplified by the client-server model. On the other hand, it has been extremely difficult to have systems communicate efficiently enough to realize cooperative processing. Cooperative processing is the division of a large program that runs on one processor into subprograms that run on many processors. However, the division of labor requires that the different subprograms be able to communicate quickly and efficiently. Most Unix computers and network systems have been designed with this goal in mind.

Today, there are about the same number of Unix and non-Unix systems running distributed processing applications. MCAPs were the exception in 1989. Of the users running distributed processing MCAPs, only 37% were running them on distributed Unix platforms.

In 1993, IDC does not expect the picture for distributed MCAPs to change significantly. However, Unix-based OLTP distributed systems and EIS distributed systems will lead non-Unix-based distributed systems in market share. IDC expects distributed Unix-based OLTP applications to outpace other distributed OLTP systems by 40%. Though distributed EIS systems will lead by a smaller margin, their 28% lead is still impressive.

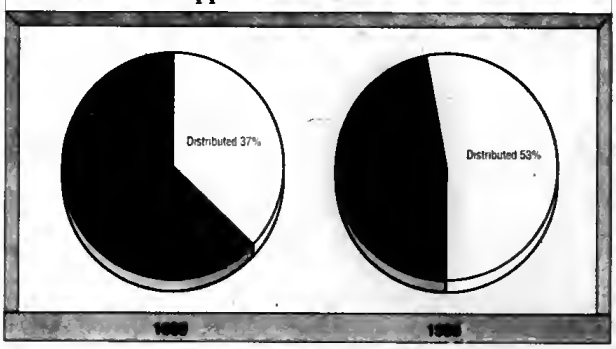
Distributed systems have existed for nearly 20 years, but they are difficult at best, to implement. However, networking is finally coming of age for more and more shops. As Unix - one of the most powerful tools for both development and production of distributed systems - becomes accepted and develops a history with the MIS community, the corporate world can expect to see more cooperative processing systems in production.

ON-LINE TRANSACTION PROCESSING AND THE PROBLEMS IT CREATES

OLTP enables users to process a transaction and receive a response in two to three seconds 100% of the time. Air travelers use OLTP systems every day. The request for flight information, seat selection and payment via a credit card are all transactions that must be accomplished in seconds to satisfy the customer.

On the high end, American Airline's Sabre system routinely completes 2,000 transactions per second across a wide-area network. On the low end, and more typical for most operations, is the point-of-sale terminal. This system can deduct an item from inventory in one transaction and check on the customer's credit line in the next. The OLTP system in this instance may only be asked to complete two or three transactions per minute.

Distributed systems vs. nondistributed systems in Unix mission-critical applications



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The marriage of OLTP and Unix is not without troubles, but they are capable of being mended by a good marriage counselor such as an independent software vendor. Though off-the-shelf Unix was not originally designed for transaction processing, both independent vendors and AT&T have been able to offer enhancements to upgrade Unix's OLTP performance.

Buffers for the disk I/O

In the interest of performance, Unix maintains a buffer for disk I/O. The actual I/O to the disk is not performed until the buffer is full. If the buffer is corrupted before the data is written to the disk, the information that the application believes has been written to the disk has not been.

With the release of System V Release 4, write-through buffers are available. A disk

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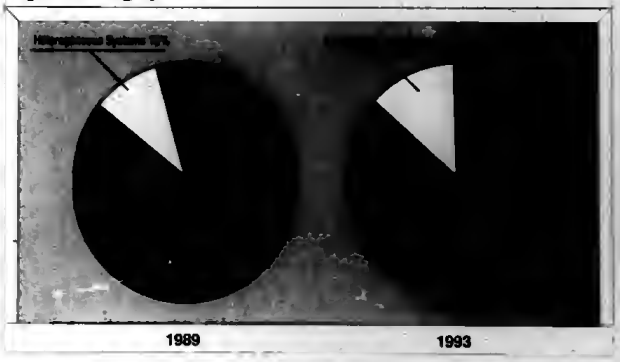

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A Data General Perspective on the Emergence of Open Architectures

Reprinted with permission of *DG Review*; based on an interview conducted between Steve Knight and Stephen R Baxter, Vice President Corporate Marketing.

Q: As a company, Data General Corporation has developed a strong standards position very quickly. What is responsible for this change in corporate philosophy?

Baxter: I want to make sure we have a definition of standards here—it is not just communications and not just open architectures. Bringing true openness and connectivity to Data General's AViiON™ Family is a fundamental aspect of that. You can look at it on four or five levels—first, it allows R&D to develop or procure products that truly meet standards, and ensures that those standards remain inviolate. Second, from an engineering and manufacturing point of view, having industry standards like SCSI or VME busses allow us to take the latest technologies and integrate them into our system. Third, by having a commitment to standards, we allow customers to pick and choose components as they put our systems in some embedded fashion into a final solution. At the next level, it allows VARs, ISVs, master VARs and distributors to pick and choose hardware and software to integrate because we clearly define where the interfaces are in terms of standards. Finally, it gives end users the best of all worlds. Having all those attributes of openness and interconnectivity really enhances their ability to react in putting the right information systems together to solve their management problems.

Q: As computers become more of a commodity, how does Data General add value?

Baxter: You picked one of the key issues, which is how do you handle the intellectual dichotomy of adding value in a standards world? Certainly the shining example of that has to be the operating system, DG/UX™. Data General's DG/UX rigorously meets all the standards of AT&T, POSIX, etc. In addition, it has a very robust file system, symmetric multiprocessing, short-term and middle-term scheduling. What we've done is give people commercial-grade capabilities they're used to in an operating system, so if an organization decides they're going to be open, they don't have to give up all those capabilities. We give them the best of all worlds, and they don't have to give up anything to get there.

What we do is look at the value-added applications from a communications and operating systems point of view and say, "Here are ways we can differentiate ourselves over and above what's offered on the marketplace today."

One capability in terms of standards is that as a member of the 88open consortium, if someone develops an application to the only RISC-based multivendor BCS that exists in our industry (the 88open BCS), and in two years someone decides to move, they can take that application and run it—without change, without recompilation, without modification—on the other vendor's systems that (support) that standard. What we've done is make it very attractive for someone to port applications to our system because it has immediate multivendor portability. It is binary compatible; we have to clearly focus our value-added capabilities (on the) scalability of our systems, from a workstation to a multiprocessor server and higher systems. We think we can go in the standards world and focus on those value-adds, and that's where we're making our investments in R&D.

Q: There have been comments to the effect that binary compatibility is an ideal that is years away from reality. Care to comment on the accuracy of that?

Baxter: I think that opposed to giving you some nice marketing answer, let me give you a practical example of what Motorola did recently. They took an application that happened to be running on a 68000, used a cross compiler on an 88000, ran it on their machine—no modification, no recompilation, no man-machine intervention, and ran it on machines of five other vendors, including Data General's, without change. No problems—zero, zip, none.

Q: What place is the workstation going to play in Data General's future, and in computing in general in the next several years?

Baxter: We strongly believe that more people are going to want and/or demand the kind of computing capability workstations can provide. It is overwhelmingly clear that the desktop is going to be the fastest growing part of the marketplace. We think the price/performance and connectivity story of our AViiON product line, and a cost-effective PC line is how we can capture the desktop, which is one of the keys to our long-term growth. It's not just with the AViiON, it's not just with terminals, it's not just with PCs—you have to satisfy a broad range of users who have different needs, and you need that type of broad-range capability and performance to do that and integrate all of them into existing networks.

Q: How do you compete in the global marketplace?

Baxter: You have to make sure that whatever the standards are, you meet them. You need what I call a "Jack's or better" approach to play in those marketplaces. You make sure you are part and parcel of the teams that are making the standards, and you make sure you have quick time-to-market implementations of those standards. I think we have consistently shown that we are as fast, if not faster, in terms of time-to-market, concept-to-delivery of a product than most major vendors.

Q: You have a fine line to walk with your installed base and who you're looking at as new customers for your AViiON computers—on the one hand having to convince customers that the ECLIPSE® MV/Family will be supported, that you'll keep R&D up to a certain level, and on the other hand, putting a lot of resources into the AViiON line. How would you grade yourself so far?

Baxter: Those are not antagonistic strategies; they're very complementary. There are many ECLIPSE MV/Family customers who are going to be ECLIPSE MV/Family customers years from now, and for whom (AViiON) is not an issue. There are some quite large ECLIPSE MV/Family customers who are looking toward open systems in terms of new applications, and we have a strong story in interoperability between our AViiON and ECLIPSE MV/Family lines. We think it is fundamentally easier to implement a Data General UNIX® system-based solution in an ECLIPSE MV/Family network than any other UNIX system-based solution, so we think (customers) can have the best of both worlds—if you want the price/performance and growth capabilities of the ECLIPSE MV/Family for the rest of your natural life, that's available to you.

If there are certain situations where open systems may be more appropriate, you can do that with Data General. We are not spending one dollar of R&D to push a migration from the ECLIPSE MV/Family to the AViiON Family. We're spending lots of dollars in R&D to make the interoperability story as compelling as possible.

Q: Would you care to consider what computing might look like in five years?

Baxter: I think we'll see dramatic changes in the adaptability of the man-machine interfaces, and extraordinary transparency in client-server models. The intelligence of the network will allow us to look at systems of computers as a single networking entity, and the most appropriate place for the data to reside and to be run will be masked from the user, and that goes a long way toward achieving the promise of true distributed computing. We call it Distributed Applications Architecture.

Q: Can you briefly touch on what your Distributed Applications Architecture (DAA) strategy is and how you see it unfolding in the next few years?

Baxter: There are a couple of key aspects. First of all, it allows for very smooth interoperability in a homogeneous environment, i.e., Data General's PCs, communications, UNIX and proprietary systems working together. Second, it really plays off the capability of working in a multivendor environment in a very transparent fashion. Third, it marries various technologies such as graphical user interfaces, PCs, and ECLIPSE MV and AViiON families and does it in a way which is technologically advanced but masks the technology from the end user. We think it's very important to smooth over, if you will, the kinds of man-machine interfaces that exist. Lastly, DAA is truly based on standards, and having that openness and interconnectivity as a fundamental part of our strategy allows the user to bring in whatever solution is appropriate. Any vendor who subscribes to industry mandated standards or to de facto standards can bring that (solution) into the DAA environment.

Data General

3400 Computer Drive, Westboro, MA 01580

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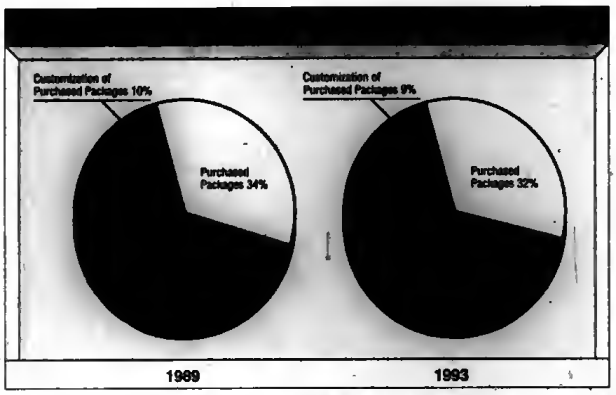
Unix/OLTP projections

A fault-tolerant system compensates for failed components, allowing the system to survive. In most cases, the work is divided among the other components. Most current flavors of Unix are not fault tolerant, but they should be. Most OLTP applications are critical to the mission of the enterprise. Any downtime for the application affects the bottom line. However, it should be interesting to watch the development of Mach, a version of Unix developed at Carnegie-Mellon University that features parallel processing enhancements. OSF has adopted Mach as the kernel for its OSF/1 operating system.

Despite the apparent drawbacks of using Unix in an OLTP environment, 45% of the OLTP sites surveyed by IDC were using Unix as their exclusive OLTP platform. An equal number were running OLTP applications on non-Unix platforms. By 1993, IDC projects that 52% of the OLTP applications will be on Unix platforms, compared with 35% on non-Unix platforms in the polled sites.

Shrink-wrapped OLTP applications present an area of opportunity for vendors. While 81% of Unix OLTP sites surveyed said that packaged Unix solutions could solve their general business problems, only 34% had actually purchased an OLTP package. For the most part, OLTP is an application field where the enterprise plans to go it alone both now and in 1993. According to IDC's survey, 55% of Unix sites are currently running internally developed OLTP applications. In 1993, that number is expected to increase to 59%. For the vendor that is able to bring OLTP applications to market, the rewards should be substantial. As a point of reference, 39% of non-Unix OLTP sites are expected to be running internally developed OLTP applications in 1990 and 1993.



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MISSION-CRITICAL APPLICATIONS: THEY COME UP AND THEY CAN'T COME DOWN

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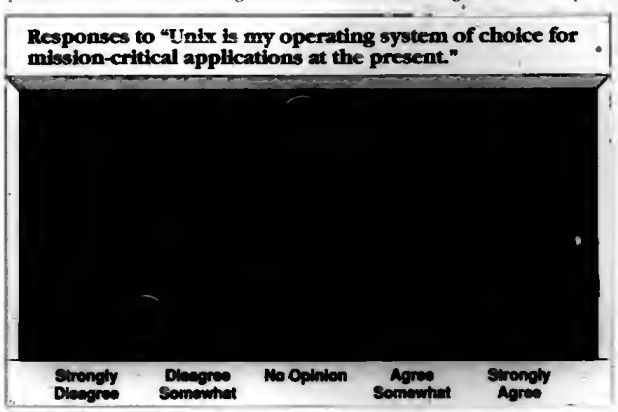

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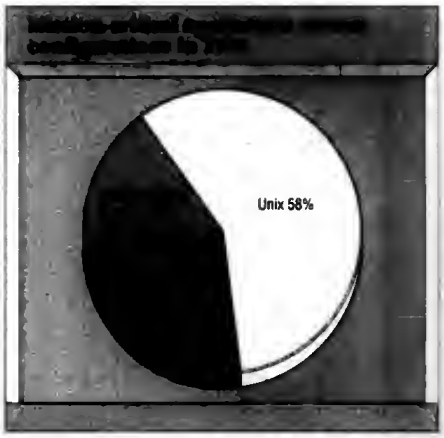
Because the success of the enterprise lies in part on the MCAP, one would expect firms to contribute significant resources toward keeping the application on the cutting edge of technology. Evidently, they believe Unix is that technology. Of the sites interviewed, 69% either strongly agreed or agreed somewhat that "Unix is my operating system of choice for mission-critical applications in 1989." IS managers indicated that their use of Unix-based MCAPs will experience a 10% growth rate by 1993.



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MCAP projections

At the sites that have implemented MCAPs, one-half of the applications have been installed on Unix platforms, while another 12% reside on both Unix and non-Unix platforms. By 1993, IDC expects the growth rate of both the Unix homogeneous sector and the Unix/non-Unix sector for MCAPs to be approximately 14% and 25%, respectively.

IDC expects that many more MCAPs will begin to incorporate new software technologies, such as expert systems. Most of these new software technologies come from research institutions, the traditional heavy users of Unix, because of this, many more corporations will accept Unix as their MCAP platform.

One of the traditional complaints about Unix is that it is not stable enough to run 24 hours a day, seven days a week. This is not reflected by the fact that 63% of MCAP installations in the survey were on nondistributed Unix systems. In placing their all-important MCAPs on nondistributed systems, the installations were wholly placing success of their corporation on Unix platforms. These companies obviously have a strong faith in Unix.

EXECUTIVE INFORMATION SYSTEMS AND DECISION SUPPORT SYSTEMS

Commercial Unix offers a new set of solutions to EIS and DSS users. These users - typically senior corporate officials and planners - require efficient systems capable of linking diverse networks and collecting information from far-flung corporate environments. Unix is finding a niche in two ways. First, cost-effective Unix systems are an attractive alternative to mainframe-based EIS and DSS systems. Second, Unix offers a possible solution for IS executives who must integrate data access across a broad spectrum of information processing environments.

EIS/DSS applications are used to improve organizational decision making. Therefore, these applications can help users translate information assets into corporate profits.

EIS and DSS come of age

Both EIS and DSS grew up in the IBM mainframe environment. Decision support packages trace their lineage to the late 1960s. Modelers and financial planners recognized that modeling packages would allow them to rapidly access and analyze corporate information stored on centralized mainframes. DSS applications grew as more information found its way to these central repositories.

Commercial EIS applications emerged in the 1980s as a response to executives' increasing requirements for faster access to corporate information in more usable formats. The evolving distributed information technologies have facilitated both the rapid access and graphical display of corporate information.

However, the same technologies that have facilitated both EIS and DSS growth will complicate the task of obtaining corporatewide information. IS managers have adopted distributed systems as a cost-effective and user-friendly solution to reduce mainframe backlog and multimillion-dollar price tags.

Distributed systems, however, mean distributed information. Therefore, EIS and DSS users need an equally inexpensive distributed capability to access and process this corporate information, a role that Unix fits quite nicely.

Vendor moves

EIS and DSS vendors recognize the emerging importance of the commercial use of Unix. DSS vendors began porting their products to the Unix world several years ago. EIS vendors are poised to follow.

Both SPSS and SAS have ported their products to Unix and are presently enjoying the fruits of their labor. Indeed, SAS's Unix product is one of their fastest growing.

Other leading DSS vendors are also preparing inroads into the Unix marketplace. Execucom Systems Corp. recently announced Paradigm, which is expected to compete heavily with Data Interpretation System from Metaphor and IBM. Paradigm offers a combination of spreadsheet, data access and presentation tools.

In the EIS arena, Execucom's Executive Edge is currently running on a multitude of Unix platforms. Also, Pilot Executive Software has announced a version of Command Center, its popular EIS package for HP/UX, HP's Unix environment. These systems will be effective in client-server environments as well as in more traditional organizations.

EIS/DSS projections

Although it is slowing, internal development has been and will continue to be a popular choice among those planning new EIS installations. Recent IDC research indicates that about 50% of all EISs are developed internally. The rich set of development tools in the Unix environment makes it a natural for EIS developers. Over 60% of all Unix users viewed Unix as the operating system of choice for EIS and DSS systems.

Unix's appeal as an EIS/DSS operating system is evidenced in user plans for

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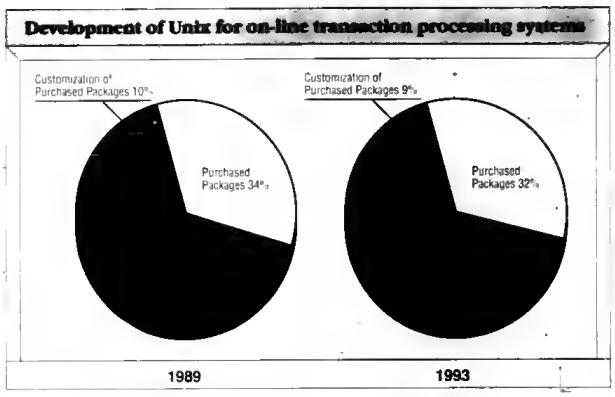

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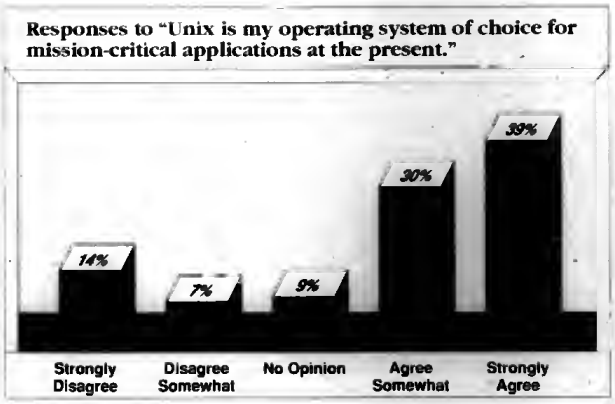

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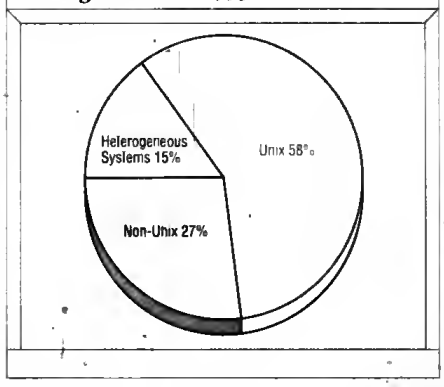
Mission-critical application system configurations in 1993



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One of the traditional complaints about Unix is that it is not stable enough to run 24 hours a day, seven days a week. This is not reflected by the fact that 63% of MCAP installations in the survey were on nondistributed Unix systems. In placing their all-important MCAPs on nondistributed systems, the installations were wholly placing success of their corporation on Unix platforms. These companies obviously have a strong faith in Unix.

EXECUTIVE INFORMATION SYSTEMS AND DECISION SUPPORT SYSTEMS

Commercial Unix offers a new set of solutions to EIS and DSS users. These users - typically, senior corporate officials and planners - require efficient systems capable of linking diverse networks and collecting information from far-flung corporate environments. Unix is finding a niche in two ways. First, cost-effective Unix systems are an attractive alternative to mainframe-based EIS and DSS systems. Second, Unix offers a possible solution for IS executives who must integrate data access across a broad spectrum of information processing environments.

EIS/DSS applications are used to improve organizational decision making. Therefore, these applications can help users translate information assets into corporate profits.

EIS and DSS come of age

Both EIS and DSS grew up in the IBM mainframe environment. Decision support packages trace their lineage to the late 1960s. Modelers and financial planners recognized that modeling packages would allow them to rapidly access and analyze corporate information stored on centralized mainframes. DSS applications grew as more information found its way to these central repositories.

Commercial EIS applications emerged in the 1980s as a response to executives' increasing requirements for faster access to corporate information in more usable formats. The evolving distributed information technologies have facilitated both the rapid access and graphical display of corporate information.

However, the same technologies that have facilitated both EIS and DSS growth will complicate the task of obtaining corporatewide information. IS managers have adopted distributed systems as a cost-effective and user-friendly solution to reduce mainframe backlog and multimillion-dollar price tags.

Distributed systems, however, mean distributed information. Therefore, EIS and DSS users need an equally inexpensive distributed capability to access and process this corporate information, a role that Unix fits quite nicely.

Vendor moves

EIS and DSS vendors recognize the emerging importance of the commercial use of Unix. DSS vendors began porting their products to the Unix world several years ago. EIS vendors are poised to follow.

Both SPSS and SAS have ported their products to Unix and are presently enjoying the fruits of their labor. Indeed, SAS's Unix product is one of their fastest growing.

Other leading DSS vendors are also preparing inroads into the Unix marketplace. Execucom Systems Corp. recently announced Paradigm, which is expected to compete heavily with Data Interpretation System from Metaphor and IBM. Paradigm offers a combination of spreadsheet, data access and presentation tools.

In the EIS arena, Execucom's Executive Edge is currently running on a multitude of Unix platforms. Also, Pilot Executive Software has announced a version of Command Center, its popular EIS package for HP UX, HP's Unix environment. These systems will be effective in client-server environments as well as in more traditional organizations.

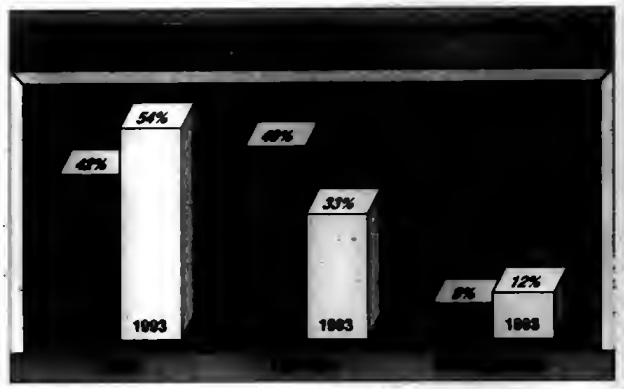
EIS/DSS projections

Although it is slowing, internal development has been and will continue to be a popular choice among those planning new EIS installations. Recent IDC research indicates that about 50% of all EISs are developed internally. The rich set of development tools in the Unix environment makes it a natural for EIS developers. Over 60% of all Unix users viewed Unix as the operating system of choice for EIS and DSS systems.

Unix's appeal as an EIS/DSS operating system is evidenced in user plans for

future systems. As the table beside illustrates, the percentage of users with EIS/DSS installations on Unix platforms will increase from 42% to 54% over the next four years, while at the same time non-Unix platforms will decrease from 49% to 33%. Commercial users with Unix experience view Unix as a strong platform for EIS/DSS applications.

Unix users are finding it easier to install EIS/DSS packages. New products from EIS/DSS vendors will significantly reduce the amount of internal EIS/DSS development in user shops. Internal development, which accounted for over 50% of all EIS/DSS installations on Unix systems in 1989, will only represent 45% of applications in 1993. Clearly, users will take advantage of new application packages for their Unix systems.



Top management will increasingly depend on Unix for their executive information systems and decision support systems

ENTERPRISE SOLUTIONS AND STANDARDS: THE PUSH FOR COMMON INTERFACES AND PLATFORMS

Consider the challenges of having three different types of computers with seven applications from assorted vendors all running under the same roof and sometimes by the same person: 1. The function key on one application is used for help, while on another application, it is used to delete. 2. With each new computer system, both the support staff and users need to be retrained. 3. Applications from the old system have to be reengineered to run on the new system. 4. Who will support the system when the vendor no longer will? The time and aggravation you have spent solving these problems have cost your organization only one thing: money.

The implementation of ESS saves money by reducing the time and cost of procurement and training. Training costs are not only reduced at the departmental level but also at the enterprise scale. The IS department and the rest of the firm will not have to be sent away to workshops for retraining.

Large numbers of firms will continue to migrate to Unix to aid their quest for ESS. Of those Unix sites surveyed, 73% agreed that Unix has made such standards possible. Among the IS managers that have implemented Unix-based ESS, Unix was chosen over VMS, MVS, OS/2 and MS-DOS for three reasons. First, Unix is the only major multiuser, multitasking operating system available on systems ranging in size from personal computers to supercomputers. Second, Unix has very good communications and networking capabilities. Third, Unix provides a standard that is largely hardware and software vendor-independent.

However, Unix is a product of AT&T. Companies that want to modify their Unix operating system are required to buy source code from AT&T, and a license fee must be paid with every sale. Therefore, Unix is essentially a product being provided by a single vendor. IEEE's Posix defines a Unix-like operating system available from a number of software vendors, it may help move the industry away from relying solely on AT&T.

Saving money with ESS

Unix is unique in that it is an operating system supported by a large number of software and hardware vendors. Rather than being locked into a short list of suppliers, users can choose from a long list of suppliers. The greater number of competitors encourages the vendors to keep their prices down and maintain a high quality level of product and service.

ESS projections

Unix opponents continue to argue that its competing versions prohibit the operating system from being a building block of ESS. IDC's findings dispute that belief. Sixty-four percent of Unix sites surveyed agreed that they are currently able to move applications seamlessly from one Unix platform to another. Only one-fifth of those surveyed indicated that it was difficult for their organization to move applications among different Unix platforms.

IDC's research also indicates that only one application area, office automation (OA), is currently enjoying major benefits from ESS while competing standards have hindered the penetration of Unix as an effective ESS market player.

THE BOTTOM LINE

Unix is ready to accept the commercial world. Is the commercial world ready to accept Unix? Those in the know already embrace Unix as their solution to the problems facing the world of IS in the 1990s. Those who ignore the Unix phenomenon will be left behind in this new decade.

IDC expects to see a unified Unix product from OSF and UI by the end of 1993. Should users delay Unix purchases until then? No. As in the past, the joint product operating system will be backward-compatible with existing versions. Therefore, if the solution to your business problem already exists under Unix, do not delay your purchase.

Unix is the operating system that will solve the problems of the 1990s; it stands tried and tested before you today. The MIS shops from a variety of industries that have already implemented Unix-based business solutions are succeeding today and will be thriving tomorrow. △

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*The Wall Street Journal (1987) — "Survey of the Information Processing Marketplace."
*The Adams Co. (1988) — "Information Systems Management Study."

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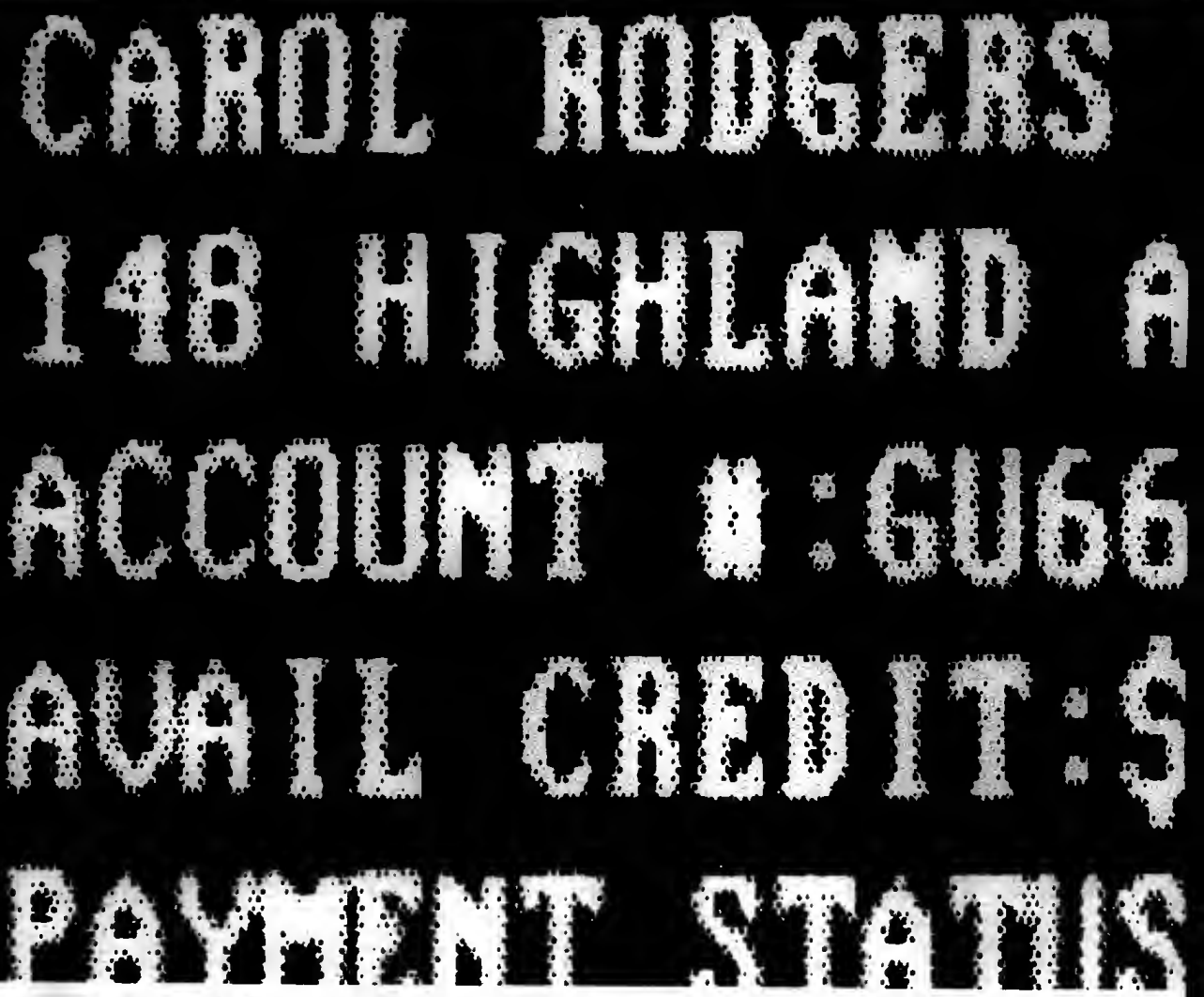

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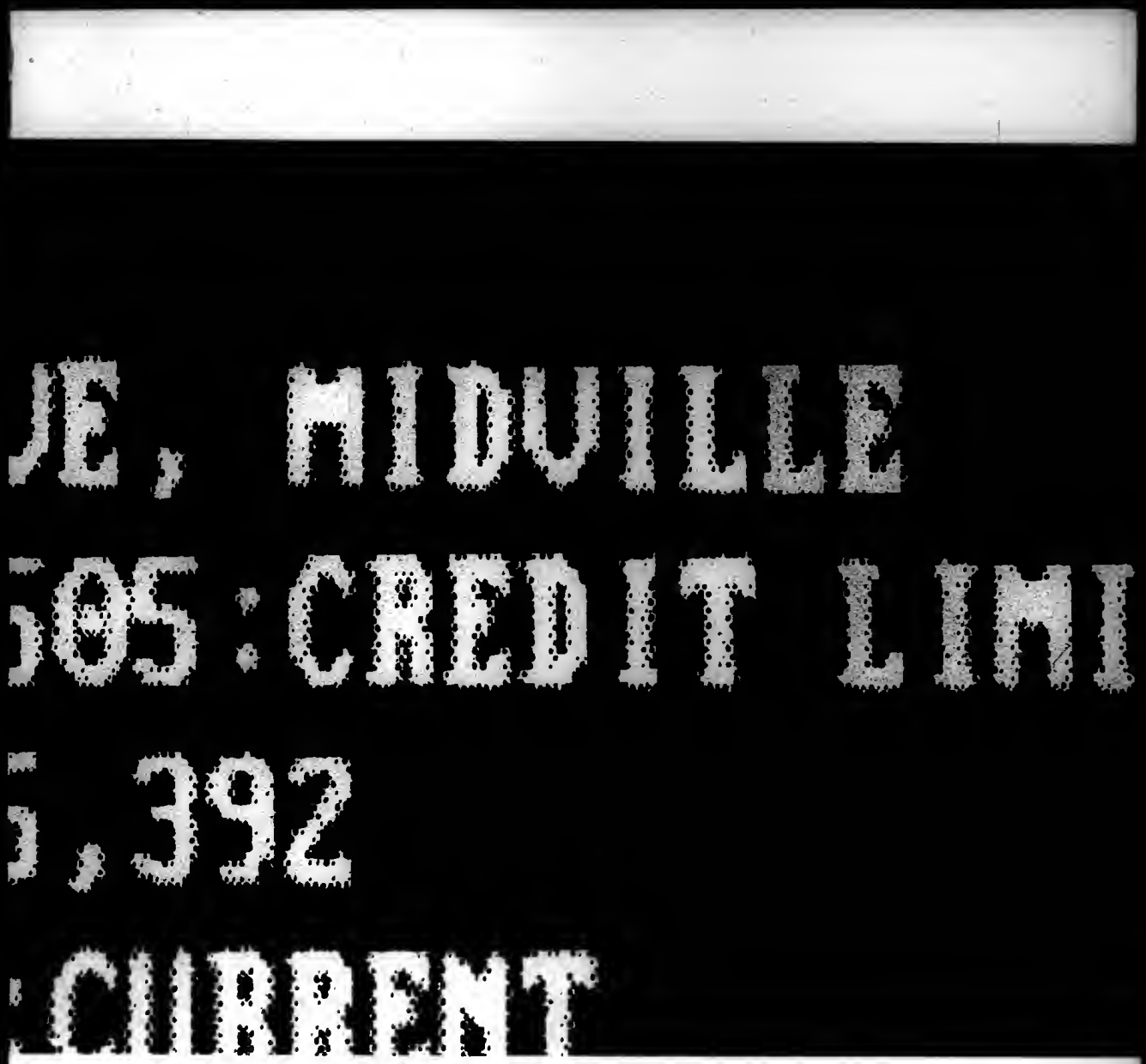

THE YEAR OF LIVING DANGEROUSLY.

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PC Magazine Editor's Choice, April 25, 1989

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MICRO BITS

Douglas Barney

Missing the bus

If this column had been published in mid-1987, it would have called Extended Industry Standard Architecture (EISA) a brilliant idea. What fool wouldn't have wanted a machine with all the features of IBM's Micro Channel Architecture but with total backward compatibility?

There is no doubt that EISA would have been a prime example of forward, almost visionary, thinking *if* it had been done at nearly the same time that IBM announced its now-infamous Micro Channel.

But no, EISA shipped about 2½ years after IBM announced and shipped its once-maligned Micro Channel. Although the ideas behind it were proposed in 1985, EISA was announced only after customers began to move toward the IBM bus, which legitimized its feature set.

EISA's problem is not a technical one. EISA is a better bus. The problem is the motives of the EISA vendors. For example, the timing sent out the disturbing message that EISA vendors were attempting to manipulate the minds of infor-

Continued on page 66

Next steps slowly into business

ANALYSIS

BY JAMES DALY
CW STAFF

Steve Jobs and company were treated like royalty when they introduced the splashy Next, Inc. workstation 16 months ago, but today, some in the corporate world are beginning to feel the emperor has no clothes.

Although Next's bevy of breakthrough technologies initially impressed many, the company has failed to follow through in key areas. A lack of wide-ranging business software, the delayed introduction of a complete operating system and the firm's continually shifting market focus have all left the quintessential Black Box's commercial potential largely unfulfilled.

"I think it's a guiding beacon in terms of where workstation technology is heading, but I'm not sure how it fits into our shop," said Louis Linder, an applications project manager at New York Life Insurance Co. in New York.

Briefly targeted exclusively at the university market, Next's founders expected to make the great leap into the corporate world last spring when they signed a distribution agreement with retailer Businessland, Inc.

However, the Next workstation has proved to be a tough sell in the boardroom. "We're less than completely sold on it," said Don Elustondo, a software systems consultant at Metropolitan Life Insurance Co. in New York. "It's very impressive technically, but we really don't see where it fits in."

Where the machine has penetrated the business world, it has done so on a tiny scale. Most Next setups consist of one or two evaluation models, normally in the publishing department or software development labs. For

example, Lotus Development Corp., which has committed to porting 1-2-3 to the Next machine, is said to have the largest installed base of Next computers on the East Coast.

It has received high marks in several shops where it is being evaluated. "There's nothing else like it," said Jim Turpin, managing director of advanced technology development at Federal Express Corp. in Memphis. Turpin said he was drawn to the machine by its user interface, which he feels may smooth the package tracking and handling duties at the company's central office.

A Businessland spokesman said the company is well on target in terms of reaching its goal of selling $100 million worth of Next machines by September. But Businessland President David Norman said Next's delay in delivering a complete operating system and a range of salable software could hurt that projection. He added that unit sales only totaled in the hundreds last year.

"We're still in start-up mode, but we have a lot of [sales] under way," said David LaDuke, pub-

Continued on page 64

Microsoft to push for off-shelf LAN Manager

BY PATRICIA KEEFE
CW STAFF

While users wait out the year for IBM and Microsoft Corp. to synchronize identical versions of their LAN Manager-based file servers, sources claim OEMs will see faster action on delivery of a shrink-wrapped LAN Manager core [CW, Jan. 15].

Microsoft is determined to bolster LAN Manager's visibility and sales but recognizes this cannot be done unless users are satisfied that all LAN Manager servers are built on the same core. In addition, beyond standardizing servers, there is the need to push OEM products out the door.

Fewer than half of the approximately 40 LAN Manager licensees have actually shipped products, according to Mike Murray, general manager of Microsoft's Networking Business Unit. Analysts contend that only a handful have any market visibility.

Shrink-wrapped present

Consequently, in a November 1989 briefing for the press, Microsoft said it would consider offering OEMs a shrink-wrapped LAN Manager product for the same reasons it is merging its server with IBM's.

Such packaging would be particularly attractive to LAN Manager licensees such as personal computer vendors, whose primary expertise does not lie in networking. These OEMs could bundle the shrink-wrapped server software with their workstations, significantly reducing time to market and further adding to LAN Manager distribution.

"[Microsoft] won't propagate [LAN Manager] otherwise," said Frank Dzubeck, an IBM consultant and president of Communi-

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Inside

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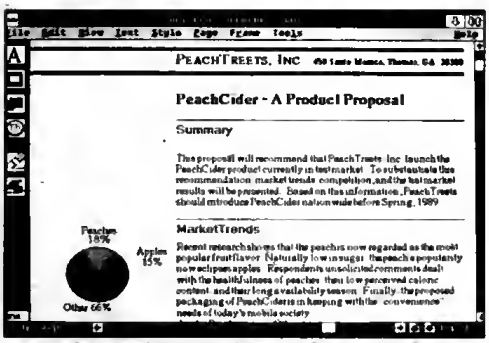
PRODUCT REVIEWS

Samna's Ami: A real contender

Ami Professional, from Samna Corp., fits in the top category of word processors along with such heavyweights as Wordperfect Corp.'s Wordperfect and Microsoft Corp.'s Word. It looks and acts very much like the original Ami, an executive word processor, but adds numerous high-end features.

As a word processing engine, Ami Professional does what all the best high-end programs do: enter text, check spelling, look up synonyms in the thesaurus, cut and paste, find and replace, enter footnotes or endnotes (but not both) or compile an index or table of contents. It sorts lines and paragraphs using ascending or descending sequences, alphabetic or numeric sorting and multiple keys. It will number lines and pages, manage columns and hyphenate. Up to eight windows can be open at one time. The program also includes headers, footers, mail merge and comment notes.

Ami Professional has a host of additional features that narrow the gap between word processing and desktop publishing. For example, text, graphics and tables can be treated as individual objects. A reasonably large selection of clip art, while primitive compared with what is available in graphics packages, is included with Ami. Text can be wrapped around frames, which can also be made transparent or opaque to anything underneath. Imported images can be scaled, rotated or moved around in a frame, and gray-scale TIFF images imported into a frame can be enhanced using contrast/brightness and other controls. Extensive tables can be drawn that include various fonts or provide a fill-in form, and Ami will even perform simple arithmetic on rows and columns. Extensive charts, such as pie charts or histograms, can be generated from a variety of data sets, including tables.



Ami Professional *lets users create a variety of charts*

For typesetters and desktop publishing mavens, Ami Professional's approach will seem completely normal, with its graphical interface, icons, floating style-sheet menus and treatment of art as single objects. However, for users unaccustomed to desktop publishing or graphics, Ami's approach to layout chores takes some careful rethinking. In the end, the what-you-see-is-what-you-get (WYSIWYG) system is more flexible and adaptable than the traditional lines and words, especially for highly complex layouts.

Ami Professional runs under Microsoft Windows and includes a runtime version. It makes limited use of Windows' dynamic data exchange (DDE) so it can be linked to other software products that support DDE. Ami Professional also imports and exports to and from a staggering number of file formats. While not every feature will translate from one system to another, the strong file-conversion routines represent a major advantage of this system. In addition, Ami Professional can use spreadsheet files, importing them into the powerful Ami Professional table facility that operates as if it were a mini-spreadsheet within the text frame.

Ami Professional supports a comprehensive and powerful macro language as well as a simple keystroke-recording macro facility.

Ami Professional comes with two main manuals and some additional information sheets, booklets and on-line files. The manuals are clear and quite complete, but sometimes the explanations do not contain enough information or examples. On-line Help offers extensive context-sensitive, indexed Help; error messages provide adequate information for most conditions.

Ami Professional Version 2.1
Price: $495
• Performance: Good to excellent • Ease of Learning: Good • Ease of use: Very good • Error handling: Very good • Support: Very good • Value: Very good

Installation can be very complex when it comes to memory usage. This mostly refers to issues associated with Windows. There is an on-line memory document that can be helpful except that, ironically, Ami most be installed to read it.

Overall, Ami Professional is very easy to use and intuitive, especially considering it is completely menu- and mouse-driven and WYSIWYG. Its visible interface and multiple views, shortcut keys for many common functions, pull-down menus and help system all combine to increase an experienced user's ability to work quickly and efficiently.

Ami Professional handles errors with style and informative messages. The automatic-save option can be set to user-specified times, although it will not work until a document has been created, closed and reopened. Ami cannot lose files on disk; however, if the auto-backup is turned off, it is possible to lose what is being edited. A multiple-level Undo reverses most activities except for sorts.

Samna provides a 90-day, unconditional money-back guarantee as well as bulletin board service support on Compuserve and facsimile support. Free technical support is available on a regular phone line. The support line was easily reached in the middle of the business day and was staffed with high-quality, knowledgeable support personnel.

At $495, Ami Professional is priced competitively. It can match features and most areas of performance with the top professional word processors, and its WYSIWYG and graphics capabilities make it even more valuable.

Samna Corp., 5600 Glenridge Drive, Atlanta, Ga. 30342. 800-831-9679.

Northgate Elegance: Living up to the name

Northgate Computer Systems, Inc.'s Elegance 386-33/2000 is a well-built tower computer system that offers top performance and low price.

It features a 33-MHz zero-wait-state Intel Corp. 80386 CPU, which is switchable to 10 MHz via turbo button. It also includes two serial ports, one parallel port, support for Intel 80387 and Weitek 3167 math coprocessors and a 220-watt power supply. Peripherals include an enhanced keyboard with the function keys on the left and a 16-bit Video Graphics Array (VGA) board.

Other features are a 150M-byte hard disk with enhanced small device interface 1:1 controller, a 1.2M-byte 5-in. and a 1.4M-byte 3-in. floppy drive, 4M bytes of 80-nsec random-access memory in single LU line memory modules with a 16M-byte maximum, and 64K bytes of 20-nanosecond RAM cache, expandable to 128K bytes.

Northgate's Elegance *tower system is a pacesetter*

Compared with other Intel 80386-based systems running at

Continued on page 60

Spreadsheet compiler brings speed boost

Version 5.0 of Baler Software Corp.'a Baler spreadsheet compiler is a complete rewrite that adds improved compatibility, better speed and many new features.

Previous versions of Baler generated Quick Basic code. However, the current version produces files that are executed with a supplied runtime program. It also reads worksheets in .WKS, .WK1 or .WR1 formats and produces a semicompiled version. Compiled spreadsheets can be distributed royalty-free along with the runtime module.

Compiled worksheets can be customized with a supplied program. For example, row and column borders can be eliminated, security can be enhanced, and colors can be changed. The developer can also prevent the user from accessing specific spreadsheet commands such as copy and move. Additional customization features include changing the menu style to the pull-down, or pop-up variety and adding context-sensitive pop-up help screens.

Baler includes many extensions to Lotus Development Corp. 1-2-3'a macro language. For example, 1-2-3'a macro menus are normally limited to eight options; Baler lets you put up to 20 options on a single menu. It also provides about 50 additional macro commands that enhance 1-2-3 capabilities and appearance. More importantly, Baler does not compile macros, so users can modify them without recompiling the spreadsheet.

The package also includes several utilities. There is a program that will modify the 1-2-3 driver set and one that will reduce the size of a compiled worksheet file by removing blank cells. Yet another utility will compress and expand any file.

Baler Version 5.0

Price: $495

- Performance: Very good
- Documentation: Good
- Ease of learning: Excellent
- Ease of use: Very good
- Error handling: Poor
- Support: Satisfactory to very good
- Value: Excellent

Two types of diagnostic reports can be requested at compile time. A "grid" report shows the formulas, values and protection status of each cell. The cross-reference report is a comprehensive listing of worksheet information, including cell dependencies.

Compiled spreadsheets typically run faster than they would in 1-2-3, since formulas are compiled rather than interpreted. Version 5.0 features minimal recalculation for even better performance. Baler worksheets have no size constraints. The compiler and runtime program will use expanded memory when conventional memory is filled and will utilize disk-based virtual memory if the expanded memory is used up or not available. However, things will slow down when virtual memory is required. Also, Baler leaves a much smaller work space than 1-2-3. As an option, an overlaid version of the runtime engine can be used, providing about 40K bytes of additional work space.

An advantage Baler has over its competitors is that it can insert additional rows in a compiled worksheet. It also allows up to 32,000 rows in a spreadsheet.

The user manual comes in a three-ring binder with slipcase. It is well organized and clearly written. There is a quick reference card and a menu map. The customization program has online help.

Baler comes on five 5-in. floppy disks, and an installation program copies the files to a directory of your choice. The manual contains a 16-page tutorial that uses a sample worksheet to walk the user through some typical operations. Baler is not intended for use by novices. Any experienced spreadsheet user should be able to compile and perform some simple customizations in about 30 minutes. Once learned, Baler is easy to use.

Any errors detected during compilation are written to a text file. The end user cannot modify or view formulas in worksheets compiled by Baler so the developer can use proprietary formulas and algorithms with no fear of them being lifted. Macros in Baler files can be modified by the user, but the cells can be protected or hidden.

Normally, the Baler program will identify nonspreadsheet input files. But if the user attempts to compile a worksheet that has been password-protected, the program bombs. The system also crashes if a user attempts to hide all columns in a compiled worksheet.

Free (not toll-free) telephone support is provided during normal Central time business hours or can be requested by facsimile. The technicians are friendly and knowledgeable.

Baler costs $495, and the runtime program along with compiled spreadsheets can be distributed with no royalties. It is both powerful and easy to use, and experienced 1-2-3 users will be able to use it with minimal delay. It easily qualifies as an excellent value.

Baler Software Corp., 1400 Hicks Road, Rolling Meadows, Ill. 60008. (708) 506-9700.

Baler'a Version 5.0 *compiler enhances 1-2-3's appearance*

IBM powers platform to market

Left behind in the Texas tumbleweed when Compaq Computer Corp. began shipping its first 386 systems, IBM was determined not to be late to market when the next great opportunity presented itself.

IBM PS/2 Power Platform 486

Price: $14,485

- Performance: Satisfactory to excellent
- Documentation: Satisfactory
- Setup: Good
- Serviceability: Satisfactory
- Support: Poor to good
- Value: Good

Thus, while other vendors were waiting for enough chips from Intel Corp. to make a few sales, IBM had already begun initial shipments of its 486 upgrade board, the Power Platform. However, Intel'a announcement of exotic bugs in the 486 chip has caused IBM to temporarily suspend sales.

The 486 chip is the major part of a small daughterboard that plugs into the 386 CPU socket of the Personal System/2 Model 70-A21, IBM'a 25-MHz Micro Channel Architecture machine. Both the IBM 70-A21 and the Power Platform have identical hard drives and controllers, as well as memory and other components.

The 486 runs memory-intensive applications such as Autodesk, Inc.'a Autocad and Lotus Development Corp.'a 1-2-3 at speeds about 40% faster than the 386-25.

> THE POWER platform is not as expandable as full-size desktop systems. It has just three slots and one 3-in. drive bay available, although the hard and floppy disk controllers, video graphics adapter as well as serial, parallel and mouse ports are built-in.

Other types of applications also run faster, although the improvement is not as great. Random-access memory tests using Ashton-Tate Corp.'a Dbase and Borland International's Paradox received a boost from the faster CPU, giving the 486 an 11% gain over the 386.

The Power Platform matches the 386 version in software compatibility. Both have a problem with Quarterdeck Office Systems' Desqview since IBM'a BIOS uses the same addresses as Desqview when running Lotus' 1-2-3 and Microsoft Corp.'a Word simultaneously.

The Power Platform is not aa expandable as full-size desktop systems. It has just three slots and one 3-in. drive bay available, although the hard and floppy disk controllers, video graphics adapter as well as serial, parallel and mouse ports are built-in.

The dealer-only support policy is typical of IBM. Users, however, tend to be pleased with the quality of support that IBM dealers provide.

Also typical of IBM is the basic design, which makes the system relatively easy to set up, and the high list price, in this case $14,485.

IBM, 1133 Westchester Ave., White Plains, N.Y. 10604. (800) 426-2468.

Northgate

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33 MHz, this unit is a pacesetter. Its CPU index, hard-disk sequential access and hard-disk random-access speeds are all very quick. In running software programs, the Elegance 386 offers significantly better times than most 25-MHz 386 systems.

> THE ELEGANCE 386 comes with outstanding documentation, including sections on installation, a quick reference card, an on-line user guide and tutorial.

In both software and hardware compatibility, the Northgate system was flawless. The company offers a customized version of OS/2.

One of the very few and exceedingly minor drawbacks is that there are just four free slots for expansion after configuration. In addition, there is no lock for the case.

The Elegance 386 comes with outstanding documentation, including sections on installation, a quick reference card, an on-line user guide and a tutorial. Support policies are also outstanding. Northgate offers a 30-day, money-back guarantee as well as one year of on-site service. Technicians are knowledgeable and helpful.

Northgate's list price of $5,595 for a fully configured unit without monitor beats its next competitor in the 33-MHz class by $755 (Fortron/Source'a 386 Netset Model 333). Combined with the system'a near-top performance and attention to detail, the unit is an excellent value.

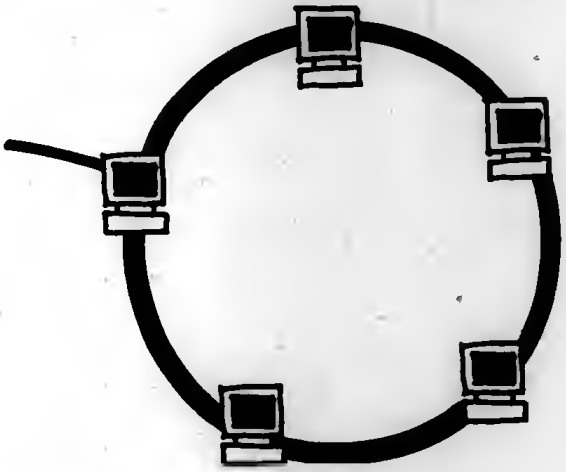
Northgate Computer Systems, Inc., Suite 110, 13895 Industrial Park Blvd., Plymouth, Minn. 55441. (800) 548-1993.

Northgate Elegance 386-33/2000

Price: $5,595

- Performance: Very good to excellent
- Documentation: Excellent
- Setup: Good
- Serviceability: Satisfactory to excellent
- Value: Excellent

The Wrong Token Ring Network Can Have A Big Impact On Your Business.



If you're not careful, the Token Ring network that seems oh-so-right can become oh-so-wrong oh-so-fast.

So we suggest you buy a LAN built around a Western Digital TokenCard.™ We're dedicated to preserving your sanity as well as your investment. That's why the products we build tomorrow are guaranteed to be compatible with the ones we build today.

But let's get another thing straight before we go any further—our Token Ring products are also IBM compatible. Not semi-compatible, quasi-compatible, or any other prefix-compatible. They're compatible. Period.

Contrary to all the hype, hyperbole, and hooey you may read in other LAN ads, our Token Ring LANs may well be the fastest money can buy. So fast that your throughput will increase dramatically. Your people will become more productive. And you'll be named Leader of the Year by several major business publications.

THE LAN FORMS HERE

The last sentence fragment is, perhaps, a slight exaggeration. But the two previous ones are absolutely true. Just checking to see if you're actually reading this stuff.

Naturally, all Western Digital Token Ring and Ethernet products are compatible with Novell NetWare and really hum in all IBM environments.

So if, for some inexplicable reason, you're still not convinced to buy Western Digital Token Ring products, let us give you yet another reason:

Our Token Ring products are available now. Today. With no delays. No excuses. No kidding.

In fact, the only thing keeping you from getting your Token Ring up and running is the fact that you're still reading this ad.

WESTERN DIGITAL

Semiconductors-Storage-Imaging-Communications

"I suppose, Dorfman, in its broadest sense, you could call this networking."

How're you going to do it?

Information that goes flying around your company, but is out of reach when you need it, can't help you compete. An IBM Personal System/2® that lets you network effortlessly can.

The IBM PS/2: Unbeatable networking tool.

A high-performance PS/2® can act as a network server or a gateway to a host, in either a DOS or OS/2® environment. With a PS/2, you can connect the personal computers you already have to an IBM Token-Ring or PC Network, and share information and resources with incredible power and speed. The PS/2's Micro Channel™ architecture was designed to make the most of OS/2's full-function multitasking. It enables your PS/2 to act as a server while also running your workstation or PC applications.

PS/2 it!

That's when the cost benefits of your PS/2 really add up. And Micro Channel's advanced interrupt handling capability lets you run multiple programs with incredible reliability. So the PS/2 is ideal to meet the demands of the busiest network, even during peak-load conditions. The bottom line is this: networking with an IBM PS/2 can help your productivity soar.

The solution is IBM. If you want advanced technology you can start with and stay with, the PS/2 with Micro Channel and OS/2 on a network are for you. See your IBM Authorized Dealer or IBM marketing representative for all the details. For a dealer near you, call 1 800 IBM-2468, ext. 182.

IBM

MICRO NOTES

User guide out for Xywrite III Plus

Xyquest, Inc. has published the 124-page *"Xywrite Programming Language User's Guide."*

Targeted at users of the word processing package Xywrite III Plus, the programming guide costs $31.95. Xyquest will honor a discount of $5 until Jan. 31.

Microspeed, Inc. is offering buyers of **American Small Business Computer**'a Design CAD 3-D a rebate coupon of $15, good toward the purchase of Microspeed'a Fasttrap 3-D trackball input device.

The rebate offer is scheduled to expire March 31.

Not to be outdone, **Toshiba America, Inc.** has stuffed every T1000 laptop with a $50 discount coupon from **Xircom, Inc.**, good toward the purchase of any Xircom pocket network adapter. Buyers must provide Xircom with proof of purchase of both products to get the $50 discount coupon.

Purchasers of **Wordperfect Corp.**'a Planperfect spreadsheet package will find an enclosed coupon which entitles them to a free copy of **Atech Software's** Publisher's Powerpak, which lists at $140.

Separately, **Wordperfect** has introduced after-hours support. Customers are now able to call 801-226-6444 for personal computer product support, Monday through Friday, from 6 p.m. to 7 a.m. (MST). The company has also added new printer support numbers.

Next

FROM PAGE 57

lishing marketing manager at Next.

Several factors appear to be gumming up acceptance, starting with the machine's cost. The official entry-level system price is $7,995, but a fully configured setup could reach $15,000. "The price is going to have to come down substantially before we [will become] seriously interested in it," said a spokesman for American Airlines, which is evaluating the machine.

The lack of a range of applications has also hurt sales. "When they get [more] software, I'll give it a try," said Ed Klein, information center director at Humana, Inc. in Louisville, Ky. "Right now I've got my hands full trying to figure out whether OS/2 will be of any value."

That situation should soon change. Developers said the arrival of the Next operating system in September gave them a real-life yardstick against which to measure their product. The system has also enabled them to move up release dates.

Wait for variety

Still, analysts warn not to expect a broad selection for at least six months. "Software takes a long time to write, especially if developers intend to fully exploit all of the Next machine's potential," said Amy Wohl, president of the Bala Cynwyd, Pa.-based Wohl Associates research firm.

"While the current application suite is pretty good, it's far from complete," admitted Dan'l Lewin, Next's vice-president of marketing.

One corporate window of opportunity that Next is stridently trying to pry open is in desktop publishing. Why publishing? "Those who push the technology the furthest and the fastest tend to do so in publishing," said Jonathan Seybold, president of Seybold Seminars in Malibu, Calif., and publisher of reports on publishing. "If you're selling a machine whose biggest claim to fame is pushing the envelope, it's a natural matchup.

However, Next officials are not kidding themselves. It is going to be a tough sell. "We've got a lot of work to do, but 1990 is going to be a good year," Lewin said. "You're going to see a lot of action."

ServiceaBull

Bull's TotalCare™ Service provides comprehensive support for Zebra printers. Nationwide.

All service suppliers promise to be responsive, but Zebra knows who delivers consistently.

Bull.

Because with over 200 locations across the country and more than 3000 service engineers, Bull can provide the support you need. Whenever you need it.

Just one phone call lets you tap the entire range of TotalCare Service, from on-site and extended maintenance, to depot repair, installation and relocation services.

Know who you can depend on for consistently responsive third-party service on computers and peripherals.

Know Bull.

Call 1-800-233-BULL, x175 for more information on Bull's TotalCare service and support capabilities.

Worldwide Information Systems

Bull

KNOW BULL

Barney

FROM PAGE 57

mation systems managers and slow the sales of Micro Channel machines. And for annoyance's sake, EISA gave rise to yet another idiotic acronym — ISA (Industry Standard Architecture) — replacing the tried and true AT bus, which stood for AT bus. With such shortcomings, EISA never really deserved to succeed.

But it will succeed. Part of this success is the sheer power of marketing. But part of it is also that EISA vendors, particularly Compaq, have stuck to their guns and rallied the proper forces to support it.

To their credit, EISA vendors have also done a great job of smoothing over EISA's rough marketing edges, obscuring its sheer hypocrisy (they all said the AT bus was fine) and tapping into the near-universal disdain for IBM's abrasive approach to market control.

They've also managed to hide the fact that it is an idea born more of marketing than engineering. And they did the thing most essential to selling products: They shipped. That alone assures EISA of some success.

But the smartest thing EISA vendors have done is to not oversell the advantages of an advanced bus. EISA is not for everyone, they say. It is only truly useful when microcomputers act as minicomputers and need a higher level of I/O.

The EISA skirmish hasn't been all bad. When not annoying, EISA was a lot of fun. It got IBM huffing and puffing, as otherwise well-mannered IBM nerds became caustic, witty and almost human.

The EISA hordes were also fun to listen to, as they countered arguments over time to market with diatribes about bandwidth, throughput and bus contention.

Now the comical battle of words between EISA vendors and IBM can stop. The battle for dollars can begin. This should be even more entertaining.

Because of its broad positioning (IBM says everyone needs a Micro Channel) and quasi-monopolistic breeding, IBM should easily win the war for dollars.

No matter, though. The EISA camp is pitching a combined line of AT bus and EISA computers (and sometimes Micro Channel), so the EISA segment only needs to put a cap on Micro Channel growth, not sell boatloads of EISA systems.

> IF VENDORS keep throwing around awful terms like bus mastering, burst mode and level-sensitive vs. edge-triggered interrupts, customers are going to start buying Apple IIs again.

Even though both camps will make money, EISA and Micro Channel proponents share the same failure. Both have been inept at explaining to personal computer users, and even to IS, what these buses are all about. All they know how to do is oversimplify or lurch into a pathetic stream of techno-babble that makes one long to be a farmer.

If vendors keep throwing around awful terms like bus mastering, burst mode and level-sensitive vs. edge-triggered interrupts, customers are going to start buying Apple IIs again.

IBM did a particularly atrocious job of explaining the Micro Channel. There was one particularly childish and insulting ad that showed a single-lane highway, meant to represent the AT bus. Then there was a four-lane highway for the Micro Channel.

How about an 18-car pileup? That would explain what happens when too much data tries to pass through a wimpy AT bus!

The release and assured success of EISA systems makes one sad point. Unlike the old days, lateness is no longer fatal and innovation no longer rules. And that is almost as shameful as a world in which IBM dominates.

Barney is editor in chief of *Amiga World*.

ResponsiBull

Bull's TotalCare™ Service is responsible for servicing Printronix printers throughout the U.S.

The people at Printronix have picked the company they could count on to provide nationwide service.

Bull.

Because with over 200 locations across the country and more than 3000 service engineers, we can be anywhere, anytime.

And we offer a variety of TotalCare programs, from on-site and extended maintenance, to depot repair, installation and relocation services. Any one of which you can tap with just one phone call.

For consistently responsible third-party service on computers and Printronix printers, Know Bull.

Call 1-800-233-BULL, x175 for more information on Bull's TotalCare service and support capabilities.

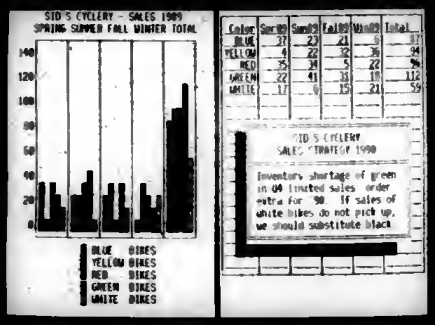
Worldwide Information Systems

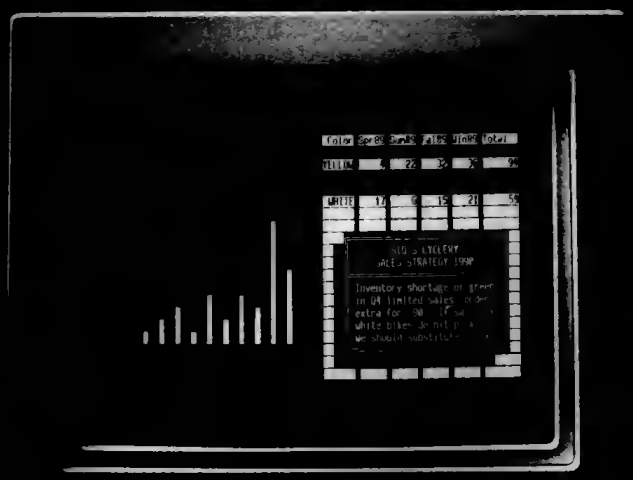
Bull

KNOW BULL

It's not how many things a terminal can do.

It's how many you can read.





Introducing the Wyse WY-370 General-Purpose Color Terminal.

Few terminals—even monochrome—do as much. The WY-370 supports multiple display formats, high resolution characters, dual host/dual sessions, and operator defined horizontal and vertical windows. But no matter how complex you make the display, the WY-370 makes it simple to read.

It lets you simultaneously display 64 foreground and 64 background colors to keep data separate and distinct. A borderless screen, thanks to overscanning, and a virtually flicker-free 74 Hz refresh rate make it even easier on the eyes.

No color terminal offers so much flexibility and versatility. The WY-370 is compatible with ASCII, ANSI, and Graphics. So it runs all your current applications in those environments. In color. With no software change required.

And the advanced styling and ergonomics meet the standards that have made Wyse the number one independent manufacturer of terminals.*

The new Wyse WY-370. If you thought only a monochrome terminal could provide the functionality you require, it will definitely color your thinking. For full information, call today.

1-800-GET-WYSE

WYSE

Users call for revamp on service

BY PATRICIA KEEFE
CW STAFF

Microcomputer software service and support used to mean free access to an 800 number for six months, followed up by reseller indifference and a tiered system of mostly hot-line support and discounted upgrades from the vendor for a price.

It worked for most standalone packages, but this approach will not cut it with today's integrated and feature-rich applications — hence the recent emphasis on service and support among software suppliers.

Users and analysts said this is just the tip of the iceberg and cited the following five developments they claim are forcing the issue:

- The advent of sophisticated microcomputer software, meant in some cases to replace mainframe or minicomputer-based programs. "The dividing line between micro and mainframe software has blurred to the point where it doesn't really exist anymore," said Jeffrey Tarter, publisher of the "Softletter" newsletter.
- The prevalence of networks. "It's no longer an individual user copy of Lotus — it's networked. The files are shared," said Ken Wasch, executive director at the Software Publishers Association. "This is not unlike the mainframe, time-sharing business."
- The inability to rely on the distribution channels to provide in-depth support.
- Vendors seeking another source of revenue. "Most of the micro companies sold you a technology; they are evolving into selling you a solution," said Sheldon Laube, director of advanced technology at Price Waterhouse in New York.
- Confusion over operating environments, which has slowed down software sales.

Developer boon

None of this has been lost on the development community.

In the last month, Ashton-Tate Corp. and Aldus Corp. have revamped their service programs, with Ashton-Tate offering a variety of unlimited and/or free telephone support programs and Aldus unveiling a micro software first — a 900 number for telephone support. Odesta Corp. just unwrapped what it says is a comprehensive technical support program for its database users and developers.

Lotus Development Corp., which has been sounding the service bell for several months now, went to 24-hour phone support, seven days a week, in June. It is experimenting with a 900 number and will introduce a custom application development service in March [CW, Jan. 15].

Lotus is also looking at using its compact disc/read-only memory technology as a training aid, said analyst Barbara Isgur, a vice-president at Needham & Co. A number of developers, as well as distributor Corporate Software Corp., are looking at the 900 number concept, according to Isgur.

In addition, pressure to downsize is making users more receptive to offers such as custom development work. "It's attractive from an outsourcing standpoint," Laube said. However, he said he would not contract out development of anything he sees as a competitive tool, such as Notes.

The Lotus spokeswoman claimed users with a large investment in Lotus software are "excited" about the concept. "If you said, 'Gee, I can have someone at Lotus do this work,' you'd see a lot of eyebrows go up around here among the information center people," agreed Ron Goldfarb, manager of new technology at Pratt & Whitney in East Hartford, Conn. He said Pratt & Whitney is looking at downsizing.

Lotus has offered such services in the past, but they have gone over "like a lead brick," said a skeptical Tarter. Most users are unwilling to pay much for service, he said: "I think it's going to be a hard sell."

Yet when IS gets the word to downsize, Goldfarb said, the first reaction is, "But we have more PCs and workstations than ever" to support. "With everyone moving to downsize, no one seems to care how much it costs to have the same things done outside — the head count is the issue," he added.

It is not just downsizing. "The backlog for applications development work in large corporations is incredible," Isgur said. Users facing six- to 24-month backlogs often cannot wait that long.

The 900 number appeals to the limited service needs of Price Waterhouse. Laube termed the 900 number "an intriguing idea" but added that billing issues and control are important. Otherwise the cost would "blow you away."

Tarter added that this could be difficult to set up since the phone company gears 900 numbers toward a lot of lines handling a lot of calls. The Ledgeway Group, a service and support consulting firm in Lexington, Mass., added that a 900 number allows vendors to force customers with lower levels of support to be more discriminating about calling in.

Wingz span spreads

BY JEAN S. BOZMAN
CW STAFF

SAN FRANCISCO — Informix, Inc. is preparing to spread its Wingz graphical spreadsheet beyond Apple Computer, Inc.'s Macintosh. Last week, the company said it will deliver support for the Unix, MS-DOS and OS/2 environments by June.

Informix executives detailed plans to ship Wingz for Unix computers running under the Open Software Foundation's Motif interface for workstations made by Sun Microsystems, Inc. and Next, Inc.; IBM Personal Computers running DOS under Microsoft Corp.'s Windows; and IBM Personal System/2s running OS/2 under Presentation Manager.

The plan to move Wingz to multiple platforms was outlined at Comdex/Fall '89 last November, but the pace of the migration was not. "Unveiling that number of products over the next six months is quite an undertaking," said Marshall Moseley, an analyst at Dataquest in San Jose, Calif. "That kind of cross-platform availability sells software, but it requires a lot of quality assurance testing before those packages roll out the door."

At the same time, Informix is linking Wingz to its Online relational database management system, which is aimed at multimedia applications using digitized images and voice. As demonstrated earlier this month, users will be able to point and click on Wingz icons to generate SQL queries.

A new Datalink interface will handle the communications and SQL translation between Wingz and the Online RDBMS, although Datalink will also work with a standard Informix RDBMS.

The Datalink module will be available in March as a $25 upgrade for users of Wingz 1.1. Future Wingz versions will include Datalink at no additional charge, said Doug Edwards, executive director of software marketing.

Previously, there had been no linkage between the company's mainline RDBMS software and the Wingz package.

LAN Manager

FROM PAGE 57

cations Network Architects, Inc. in Washington, D.C.

Murray declined to comment on the existence of "an unannounced product," but 3Com Corp. executives displayed no such reticence. "We're all for whatever will increase LAN Manager's market presence," said Eric Benhamou, 3Com's executive vice-president of product operations. "You'll see it happen in the second half of this year."

John Dunkle, a consultant at Workgroup Technologies, said Microsoft officials indicated to him it could happen as early as this quarter.

Both Benhamou and founder Robert Metcalfe said 3Com is primarily lending Microsoft testing expertise. Issues to overcome include "crossing the gap between an OEM-quality product and an end-user-quality product," Benhamou said.

The difference between the two comes down to several hundreds of thousands of man-hours of testing the product and improving installation and documentation, he added.

Once this core is established, 3Com will shift its focus to providing value-added services that will run on LAN Manager servers. Microsoft will then pick up the marketing baton, rolling out a variety of campaigns designed to move LAN Manager servers into the information systems spotlight.

MICROSOFT IS determined to bolster LAN Manager's visibility and sales but recognizes this cannot be done unless users are satisifed that all LAN Manager servers are built on the same core.

This will include stepping up advertising and providing informational seminars nationwide. "We may also look at adding some people to our field support organization who can help OEMs or even large corporations understand our product from a technical point of view," Murray said.

In an interview last year, Murray had expressed disappointment over the failure of OEMs to loosen Novell, Inc.'s grip on the local-area network market. At the time, he warned that if OEM sales did not improve appreciatively, Microsoft would be forced to look to other channels of distribution by mid-1990.

Last week, Murray updated that plan, reiterating that LAN Manager needs broad distribution to be "viable." He said that Microsoft has to make sure that IS managers looking into LANs are aware of LAN Manager first and have access to the product second.

If the latter becomes an issue, Murray said Microsoft would need to find complimentary distribution that does not conflict with its OEMs, which does not rule out direct sales. He lauded Novell's distribution efforts and said he is studying its strategy.

Consequently, 1990 will be a year of marketing and distribution activity. "1990 looks like a very different year in terms of availability of the product and its quality," he said.

NEW PRODUCTS

Peripherals

NEC Technologies, Inc. has introduced two laser printers, each offering 8 page/min.

The Silentwriter2 260 provides Hewlett-Packard Co. Laserjet Series II emulation, and the Silentwriter2 290 includes HP Laserjet Plus emulation as well as Adobe Systems, Inc. Postscript capabilities.

They are priced at $2,995 and $4,495, respectively.

NEC Technologies
1414 Massachusetts Ave.
Boxboro, Mass. 01719
508-264-8000

Amdek Corp. has announced a 14-in., high-contrast screen, multifrequency monitor.

The AM/738 Smartscan Monitor can display and switch between all industry-standard resolutions including IBM's Video Graphics Array (VGA), Super VGA and IBM 8514. It is specially suited for use with high-resolution graphics packages, the company said.

The suggested list price is $835.

Amdek
3471 N. First St.
San Jose, Calif. 95134
408-922-5700

A 24-pin, letter-quality, dot-matrix printer that can output 180 char./sec. in draft mode and offers a 136-column carriage width has been announced by Epson America, Inc.

Designated the LQ-1010, the unit is targeted for small- and medium-size businesses and carries a suggested retail price of $699.

Optional accessories include a multifont module and software packages for the Apple Computer, Inc. Macintosh computer and the Microsoft Corp. Windows environment.

Epson America
2780 Lomita Blvd.
Torrance, Calif. 90505
213-539-9140

Lasergraphics, Inc. has reduced the list price of its LFR Digital Film Recorder by $1,000.

Designed for desktop presentation slide production, the recorder is available for the IBM Personal Computer, Personal System/2 and compatible computers, as well as for the Apple Computer, Inc. Macintosh. Pricing for each configuration is $8,950 and $8,750, respectively.

Lasergraphics
17671 Cowan Ave.
Irvine, Calif. 92714
714-660-9497

Macintosh products

Digital Products, Inc. has announced a utility designed for printer sharing and file transfer in mixed DOS and Apple Computer, Inc. environments.

Dubbed Macshare, the product permits an Apple Macintosh to be connected via its RS-232 serial port to a Digital Products' Netcommander or Printdirector sub-local-area network unit. This procedure enables the Macintosh to share a Hewlett-Packard Co. Laserjet series machine or compatible laser printer and also facilitates file transfer to DOS-based personal computers linked to the Netcommander unit.

The software costs $120.

Digital Products
108 Water St.
Watertown, Mass. 02172
617-924-1680

Meridian Software Systems, Inc. has announced a native-code Ada compiler for the Apple Computer, Inc. Macintosh. Scheduled for release next month, the product will include an optimizer and enhanced generic and pre-emptive tasking capabilities.

The firm will update its customer base for a charge of $25 per client.

Meridian
10 Pasteur St.
Irvine, Calif. 92718
714-727-0700

Systems

Commax Technologies, Inc. has introduced a 13-pound, 32-bit laptop computer that is based on an Intel Corp. 80386SX microprocessor.

Called the Excell LT-386SX, the system includes 2M bytes of random-access memory, which is expandable to 4M bytes, and a 40M-byte hard drive. The system costs $3,995.

Commax
2031 Concourse Drive
San Jose, Calif. 95131
408-435-5000

NEC Technologies, Inc. has announced an upgraded version of the Ultralite laptop computer, which includes a removable battery pack that operates for up to two hours. The computer weighs 4.4 pounds and is driven by a NEC V-30 processor running at 9.83 MHz.

The 1M-byte version has a suggested retail price of $2,499, and a 2M-byte system is available for $2,999. Additional batteries cost $119.

NEC Technologies
1255 Michael Drive
Wood Dale, Ill. 60191
708-860-9500

DATA STREAM

Alan McDonald

Netosaurus Wrecks?

Once the dominant dinosaurs of corporate computing, mainframes are being driven out of their natural habitat by microcomputers that provide 1,000-to-1 cost advantages in millions of instructions per second per dollar.

The question arises as to where these dinosaurs can migrate and find expanded food supplies? The dinosaur herdsmen at IBM, Unisys and other companies are desperately searching for vast grasslands that can support their beasts.

Several promising regions, in which hundreds of thousands of terminal users might be captured to sustain the hunger of mainframe dinosaurs, are within the bountiful plains of the regional Bell operating companies (RBOCs). After all, these fields already support a related dinosaur species (the central office switch) merely from the food supply of voice telephony.

The logic of the mainframe herdsmen and their RBOC neighbors seems to be that, in addition to plain old telephone service, every business in an area code could be offered voice mail, electronic mail, facsimile

Continued on page 78

Feds check on telecom's pulse

NTIA begins study of the nation's communications infrastructure

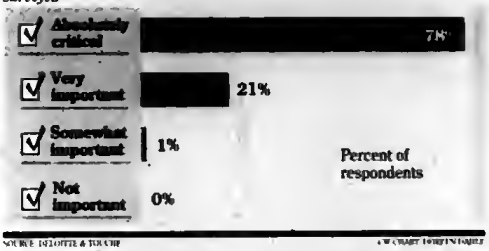
BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The Bush administration, concerned that the U.S. public network could fall to second-rate status compared with Europe and the Pacific Rim, has launched a wide-ranging study of the nation's telecommunications infrastructure.

The National Telecommunications and Information Administration (NTIA), an arm of the U.S. Department of Commerce that opened the inquiry, is seeking comments from industry spokespersons and users on the proper mix of public policies to ensure that the network infrastructure meets the future needs of users and enables U.S. firms to be competitive in global markets.

Critical mass

The importance of the U.S. telecommunications infrastructure was cited as very important or critical by 99% of 500 U.S. business leaders surveyed



SOURCE: ARTHUR D. LITTLE & TOUCHE

For example, the NTIA asked whether revenue from the 3% federal excise tax on telephone service — which generates between $2 billion and $3 billion per year — should be directed to funding improvements in the public network, just as the federal gasoline tax is earmarked for interstate highways. The telephone tax now goes into the general revenue fund of the U.S. Treasury.

The NTIA also sought comments on whether changes are needed in the AT&T divestiture decree, rate-of-return regulation, depreciation rules, Open Network Architecture plans and the network standards-setting process.

However, some users are skeptical of the claim that the U.S. public network is in trouble. "It's hard to make the case that we're behind when U.S. customers have far greater choices in communications products and services than customers in any foreign country," said Richard A. Fazzone, telecommunications affairs manager for GE In-

Continued on page 78

New net feathers poultry giant's nest

ON SITE

BY ELLIS BOOKER
CW STAFF

SPRINGDALE, Ark.— Tyson Foods, Inc. will hatch a new network this year that will break its traditional style of computing.

The nation's largest poultry-processing company, Tyson has committed to spending $9.2 million over the next three years to replace a cross-country network composed of an aging Unisys Corp. mainframe and Unix-based field computers with Digital Equipment Corp. VAXs and workstations connected via a 60-node Ethernet.

The DEC systems will do away with what to date has been a mixed hardware, software and communications environment, and they will likely feather the nest for future distributed computing applications across Tyson's six sites nationwide.

The decision to replace the Unisys 1100/92 mainframe and the network it supported was driven by Tyson's corporate expansion, according to Dan Snyder, vice-president of management information systems for the poultry processor.

Tyson

Last year, for example, Tyson acquired fresh chicken supplier Holly Farms Corp., a move that will almost double Tyson's size from a $2.3 billion company to a $4 billion company this year. When Snyder joined the company from a service bureau in 1979, Tyson's annual sales were just $350 million.

"We had been a customer with Sperry [now Unisys] for 20 years," said Snyder, who invited Unisys last year to come in and outline an expansion plan.

"At the same time, I had IBM and Digital come in and make proposals," he said.

DEC won the contract last May after a four-person group in Synder's 20-person IS staff tallied a 26-point form evaluating the three vendors.

DEC's reputation for networking excellence was not the key factor in its selection, however. Rather, DEC's propos-

Continued on page 77

Inside

Epson EPL-6000. HP emulation. 6 PPM. 512KB RAM, expandable to 4.5MB, one year limited warranty. *Manufacturer's Suggested Retail Price. Dealer prices will vary. HP LaserJet II

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IBM

T1 card broadens ISDN access

BY SALLY CUSACK
CW STAFF

Teleos Communications, Inc. recently introduced a server card that permits a variety of non-Integrated Services Digital Network (ISDN) devices to access ISDN services.

The device — the T1IU — is a T1 peripheral card that fits into a single slot of Teleos' IAP6000 ISDN Access Server, enabling customers to use existing premises equipment such as private branch exchange (PBX) systems, local-area networks and ISDN services currently offered by the interexchange and local-exchange carriers.

According to Michael Berger, director of marketing at Teleos, individual 56K or 64K bit/sec. channels within the T1 access lines can be allocated to various devices and carrier offerings (such as inbound or outbound WATS or a packet-switched service) on a call-by-call basis and will provide customers with a significant savings on local carrier access charges. Call-by-call eliminates the need to purchase separate dedicated access lines for voice and data services. However, users still must wait for carriers to provide bandwidth-on-demand capabilities before they can take full advantage of the call-by-call feature.

Program for peak hours

Each call is analyzed by the Callview software package included with the T1IU. By prioritizing bandwidth service, the users can decide how many lines are necessary at peak hours and program them in accordingly.

"When carriers implement bandwidth on demand [in their ISDN services], and I just pay for usage, that will be a great benefit, assuming it's tariffed properly," said Robert Haas, a vice-president of planning engineering at American Express Travel Related Services Worldwide Telecommunications. The company is a current ISDN user.

Teleos' introduction may bring carriers and customers one step closer to investing in ISDN, said Thomas Nolle, president of CIMI Corp., a Haddonfield, N.J.-based consulting firm.

Teleos' ISDN server, equipped with the T1IU board, could provide users with a 35% to 45% cost saving in the service management area, Nolle said, adding that this type of cost justification is essential to rally support for ISDN. However, the benefits described above will become available to users only when local and interexchange carriers fully deploy ISDN services that can talk to one another, a Teleos spokesman said.

The IAP6000 is a customer premises equipment controller that, when equipped with a T1IU card, provides access to ISDN and enables migration between non-ISDN and ISDN environments. Functioning as a front end to the PBX system, it takes transmissions from multiple networking devices and concentrates them over an ISDN Primary Rate Interface link.

The T1IU is administered via a personal computer-based system console. Standard T1 A/B bit signaling is converted to ISDN Primary Rate Interface signaling protocols, thereby enabling transparent operation between ISDN and non-ISDN environments.

Teleos is currently the only firm with a product capable of retrofitting PBXs with ISDN capabilities in a generic sense, Nolle observed. The Teleos server can allocate up to 23 64K bit/sec. ISDN B channels — a full Primary Rate Interface connection — to an Ethernet LAN connection, a Teleos spokesman said. Northern Telecom, Inc. and Hewlett-Packard Co. recently announced a similar LAN connection, but it requires using an HP9000, while Teleos' LAN link requires no extra hardware beyond the board, he added.

The T1IU is priced at $4,100 per interface unit.

Senior Editor Elisabeth Horwitt contributed to this article.

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COMPUTERWORLD

IBM kick-starts SAA auto office track

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COMPUTERWORLD

The newspaper for information systems management

Poultry giant

CONTINUED FROM PAGE 71

al was the best overall, Snyder said. Snyder, who is actively seeking applications specialists with DEC experience, has budgeted $16 million over the next five years for Tyson's IS overhaul.

Nevertheless, networking Tyson's 13 remote "complexes" was a key part of the bid.

That's a lot of chicken!

Each complex — another seven are planned — contains a hatchery, a chicken feed operation and a trucking operation. The actual raising of Tyson chickens is done by local "contract growers," farmers who deliver an amazing 24 million four-pound fowls each week to Tyson's meat-processing facilities.

"The biggest advantage with the Decnet IV approach," said Paul Lothian, Tyson's information center manager and the person who is responsible for the company's Decnet implementation, "will be interconnectivity among the remote locations."

The Unisys network offered simple file transfer capabilities from small, Unix-based minicomputers (Sperry 5000 Model 50s). The minicomputers handled specific, local applications ranging from tracking truck schedules to the amount of feed consumed by the birds.

Future distributed processing through the unified DEC network will allow Tyson to "put applications and data wherever it makes the most sense to put them," Lothian said.

For instance, under one configuration now being developed, applications will reside on the Springdale processors while data will be maintained on the remote minicomputers.

The old network had another flaw, too. While an employee in the field could log onto the mainframe at Tyson's Springdale data center using protocol-emulation software, the communication was one-way only.

"If I needed to know what quantity of corn they had on hand at a particular location," Snyder explained, "I had to call the guy on the phone. He was on-line to my computer, but I wasn't on-line with his."

In the new network, the Sperry minis will be replaced with Microvax 3100s, which in turn will link to two DEC VAX 6420s in Tyson's Springdale data center over 56K bit/sec. dedicated lines.

Not quite a mainframe

Tyson's major applications will reside on the clustered 6420s. This "pseudo" mainframe, which will eventually displace the Unisys host, will run financial applications from McCormack & Dodge and, later, sales and marketing, order entry, billing, inventory and warehouse distribution systems.

In total, Tyson's Ethernet will support approximately 600 terminals, 100 of the company's 300 personal computers, 220 printers and 700 users. The 10M bit/sec. Ethernet in the Arkansas headquarters also will connect with two small Novell, Inc. local-area networks.

During the migration off the Unisys host, about two dozen protocol converters from IBM Electronics Co. in St. Louis will give remote users access to either of the hosts in Springdale.

The converters are being supplied by DEC. Snyder concludes, "I told DEC we needed their help up front while we migrated."

Snyder also plans to put DEC's top-of-the-line VAX, the two-processor model VAX 9000-420, next to the 6420s, once the initial installation is completed in August. He hopes Tyson will be one of the very first sites in the nation to place a clustered 9000 into service.

Peregrine hawks alert manager for IBM Netview

BY ELISABETH HORWITT
CW STAFF

CARLSBAD, Calif. — Peregrine Systems, Inc. has announced an interface that is said to allow its existing PNMS3 software to provide network problem administration for IBM's Netview.

The Peregrine Network Management System3 (PNMS3)/Netview Interface is said to automatically collect alerts and status information directly from Netview, filter out nonrelevant data according to preset rules and feed crucial information to PNMS3's Problem Management application.

While IBM has its own competitive problem administration product, which is called Information Management, the vendor so far has provided no way for the system to automatically collect alerts and alarms from Netview, according to a Peregrine spokesman.

PNMS3 opens a trouble ticket and follows an established problem management process through to problem resolution, which includes the issuance of escalating alerts and the compilation of statistics, Peregrine said. The entire process is said to be automatic, requiring no manual intervention from either a PNMS3 or Netview user.

Available now, the Netview interface is specially priced at $15,000 for a maximum of five users until the end of this quarter; after that, it will be priced at $18,000.

McDonald

FROM PAGE 71

mail and eventually IBM's Officevision, for just a bit more. Wouldn't everyone be better off, particularly the dinosaurs?

Well, hope springs eternal, or at least the survival instinct does, and so a steady stream of mainframe dinosaurs plod toward the RBOCs in the hope of mating with the central office switch dinosaurs.

However, there are at least two problems for the businesses that are eyed as customers for these combined central office/mainframe services. The first problem is whether they get anything in return for their support of the dinosaur. The second problem is that the entire logic of combining dinosaur mainframes with dinosaur central office switches through wired connections is counterproductive to Gilder's law of the microcosm, which states that eliminating wiring and getting to chip level results in order of magnitude increases in horsepower per dollar.

Businesses have found that by employing microprocessor-based servers on local-area networks, they can achieve dramatic "downsizing" from mainframes. In fact, the newest generation of superservers, such as Compaq's Systempro, combine symmetrical multiprocessing on the system bus. As this microcosm trend continues among vendors such as Compaq and Sun, multiplying the inherent advantage of several microprocessors on a powerful system bus, Integrated Services Digital Network (ISDN) server functionality will quickly become a reality at the customer's own site, rather than at the telephone company's central office.

It is now practical to integrate an entire ISDN private branch exchange (PBX) subsystem onto the system bus of multiprocessor superservers. This level of integration at the customer's site offers substantial advantages over central office-based attempts at integrated services.

An ISDN superserver combining computing and communications at the customer's site provides the only practical solution to LAN/WAN integration. In contrast to the RBOC-coined oxymoron of "CO LAN," an ISDN superserver leverages the real advantage of high-performance LANs with wide-area ISDN, which provides the basis for coordinating a global naming directory and routing between ISDN circuit identities and LAN addresses.

Additionally, the ISDN superserver, with interprocessor communications across a common system bus, provides the basis for effective real-time software control of tightly integrated voice/data applications, such as automatic number identification/transaction processing applications.

I suspect that the obstacle to today's superserver vendors absorbing ISDN PBX functionality is simply the inaccurate perception that traditional analog development experience is required. However, the all-digital nature of ISDN's upstream Primary Rate Interface and downstream Basic Rate Interface line controllers are becoming recognized as not substantially different from typical, high-performance, multiport data communications controllers.

Leading U.S. microcomputer server vendors will quickly identify the technical, competitive and marketing advantages that accrue to integrating ISDN PBX subsystems into their servers. This will lead to revolutionary advances in unified messages through digital voice mail, Group 4 fax mail, E-mail and integrated multimedia transaction processing applications. While this revolution takes place in the open architecture microcosm, the mainframe dinosaur may still be plodding along.

McDonald is president of Innovative Strategies, a consulting company in Carlisle, Mass.

Feds

FROM PAGE 71

formation Services, a unit of General Electric Co. in Rockville, Md.

Fazzone said U.S. telephone companies have plenty of freedom to make network investments — on a cost-plus, risk-free basis under rate-of-return regulation — and they have done so. "If anything, there is a question of whether they are overinvesting," he said.

William B. Pomeroy, director of public policy at the International Communications Association, a major user group, warned against any "massive overdose" in spending for a total upgrade of the public network, which could cost $100 billion to $300 billion. Instead, modernization should be gradual and "market-driven" to meet users' demands, he said.

In a statement announcing the study, Commerce Secretary Robert Mosbacher said that "we cannot tolerate inefficiencies in our own economy, especially in telecommunications," at a time when the U.S. is facing stiff competition from Europe and the Pacific Rim.

The NTIA said some commentators worry that the U.S. telecommunications system is lagging. The agency pointed to Europe's extensive deployment of Signaling System 7 in major business centers, as well as to Japan's deployment of digital intercity networks and its plans to install fiber to the home by 2015.

The European Community is leading the world in investment for network modernization, with spending up 7.8% to nearly $44 billion in 1989, compared with the U.S. expenditure of $24 billion by local and long-distance carriers in 1989, the agency said. The NTIA said that the trends bear watching at a time when over half of all U.S. workers are employed in service industries that are heavily reliant on information networks.

"In an information economy, deploying the right kind of telecommunications infrastructure could move the growth curve for the whole economy upward," said NTIA Chief Janice Obuchowski, in a statement.

The NTIA said that private networks are part of the nation's telecommunications infrastructure, but it hinted that widespread bypass of the public network could pose problems. When large users substitute private networks for use of the public network, the agency said, rate pressures may increase for the small business and residential users on the public network. On the other hand, the threat of bypass creates an incentive for public network providers to improve the quality and pricing of their services, the NTIA added.

NEW PRODUCTS

Local-area networking software

Softsolutions, Inc. has announced a document management software system capable of locating forgotten or unknown file names across personal computer networks.

Targeted for use by both network managers and users, Perfectsolution 1.0 allows users to create document profiles by author, application, document number, date created, date last retrieved and various other criteria, the company said. A document's text can also be indexed so that any word can be used in a full-text search across the network.

The product operates on any network supporting DOS-level redirection and locking. It is priced at $2,495 for each installed server and $295 per workstation.

Softsolutions
Park View Plaza
625 S. State St.
Orem, Utah 84058
801-226-6000

Intouch Technologies has announced a software package designed to enable personal computer users on a network to send and receive facsimiles from their individual workstations.

Dubbed Turbofax, the package enables a single fax board to serve all users on a network. The software is said to be compatible with most word processing, database and spreadsheet programs on the market. It costs $595.

Intouch
32 Roes Common
P.O. Box 806
Ross, Calif. 94957
415-461-3600

Network management

Tandem Computers, Inc. has announced a set of products created for distributed system management (DSM) functions in the Tandem Nonstop computer environment.

The DSM product line includes DSM/SNAview, a software facility that forwards management events from the Tandem system to IBM's Systems Network Architecture management software environments, including IBM's Netview and Cincom Systems, Inc.'s Net/Master; DSM/PM, a problem management and tracking system; and DSMS, a monitoring and control facility for large Tandem distributed networks. Initial license fees start at $1,100.

Tandem
Location 4-40
19191 Vallco Pkwy.
Cupertino, Calif. 95014
408-725-6000

ETI Software has announced a utility software program designed specifically for users of Novell, Inc.'s Netware.

Aimed at network managers, Netcompanion consists of 16 separate utilities, including those for user management, performance monitoring, file management, workstation configuration and queue monitoring. Server management and security features are also provided. The software package carries a suggested retail price of $349 per server.

ETI Software
636 Meredith Lane
Cuyahoga Falls, Ohio
44223
216-928-3338

Links

The Wollongong Group, Inc. has enhanced its WIN/TCP for DOS networking product.

Release 4.1 was designed to conserve memory usage. Fewer than 20K bytes of memory are now required, as opposed to the previous 90K-byte requirement. The product provides Netbios application capabilities over Transmission Control Protocol/Internet Protocol networks and provides a management feature that responds to queries from management stations. End-to-end management services for gateways and hosts are also available. The product costs $395.

The Wollongong Group
1129 San Antonio Road
Palo Alto, Calif. 94303
415-962-7250

Fiber-optic designer's kits, offered in either simplex or duplex versions for single or bidirectional data communications, are now available from Sintec Co.

The kits provide all the necessary components for constructing a 10-meter data link, including fiber-optic emitters and detectors, two bulkheads and a fiber-optic splice, the company said. Assembly and fiber termination instructions are included. Prices range from $44.95 to $89.95.

Sintec
28 8th St.
P.O. Box 410
Frenchtown, N.J. 08825
201-996-4093

Modems/ Multiplexers

Gandalf Data, Inc. has enhanced its family of short-haul and campus modems with an additional set of diagnostic capabilities.

The five-product LDS 120E series was designed to satisfy asynchronous local data communications needs, the company said. The modems are particulary suited for multistory buildings and campus environments. The new data sets operate at rates up to 19.2K bit/sec. over private or leased four-wire circuits. Features include auto-equalizing and autophasing, as well as V.54 diagnostic and integral testing functions. Prices range from $125 to $1,300.

Gandalf Data
1020 S. Noel Ave.
Wheeling, Ill. 60090
708-459-9348

Racal-Milgo has introduced a dial management system for V.32 modems.

The CMS 905 Dial Management System runs on an IBM Personal System/2 platform and provides network management capabilities for the company's RMD 3222 rack-mount and stand-alone modem line for dial networks or dedicated networks with autodial backup.

It allows users to monitor, diagnose, gather alarms, test and configure modems in networks of virtually unlimited size without any interruption. The product is priced at $2,500.

Racal-Milgo
1601 N. Harrison Pkwy.
Sunrise, Fla. 33323
305-846-1601

MANAGER'S JOURNAL

EXECUTIVE TRACK

Carol J. Anderson has been elected to the post of vice-president of MIS at **Trailer Train Co.** in Chicago. Anderson replaces **Richard E. Shelgren,** who is retiring after 38 years in the railroad industry.

Anderson was most recently Trailer Train's director of systems development and planning. As vice-president, she is responsible for all computer, communications and information systems-related activities. She joined Trailer Train in 1972 and has held several IS positions, including manager of systems development.

She holds a bachelor's degree in economics from Rosary College and a master's degree in economics from De Paul University.

Ruth M. Miller has been named vice-president of information systems at **Nautilus Insurance Co.** in Scottsdale, Ariz., a subsidiary of W. R. Berkley Corp. in Greenwich, Conn.

Miller most recently headed data processing at Firemen's Insurance Co. in Washington, D.C.

Mary Jo Ubriaco, formerly manager of the data operations group at Reader's Digest, Inc., has joined the Information Systems Group of management and technology consulting firm **Booz, Allen & Hamilton, Inc.** as a senior associate.

Ubriaco is based in Booz, Allen's New York office. She holds a bachelor's degree in mathematics from the University of Wisconsin.

Who's on the go?

Changing jobs? Promoting an assistant? Your peers want to know who is coming and going, and *Computerworld* wants to help by mentioning any IS job changes in Executive Track. When you have news about staff changes, be sure to drop a note and photo or have your public relations department write to Clinton Wilder, Senior Editor, Management, *Computerworld,* Box 9171, 375 Cochituate Road, Framingham, Mass. 01701-9171.

Coaching from behind the scenes

Calling the plays for the NFL's information group requires the talent of a star player

BY CLINTON WILDER
CW STAFF

What are the qualities that make a top National Football League quarterback? At the top of the list would be skills, team leadership, intelligence and the ability to analyze situations and respond effectively.

Both of next Sunday's Super Bowl quarterbacks, Joe Montana of the 49ers and John Elway of the Broncos, possess those qualities in abundance. And so does a different kind of NFL quarterback — Mary Oliveti, the league's manager of information processing.

Oliveti has marched her team successfully downfield for the past six years, leading the NFL from rudimentary computer usage to a sophisticated Digital Equipment Corp. VAX network shared by all 28 teams. It is an understatement to say that her coaches — the league officials — feel very confident putting the information systems ball in Oliveti's hands.

"Mary doesn't just supervise the computer operation. She asks the users, 'What do you really want to do?' and she finds the best way to do it," says Thomas Sullivan, the NFL's acting treasurer and a 22-year league employee. "That's the type of professional you want at any level."

Oliveti's playbook is far from simple. At NFL headquarters on Park Avenue in New York, her 11-member department serves about 140 users from three very different constituencies: the league itself; NFL Properties, the promotional materials marketing firm; and the NFL Management Council, which deals with player relations and contracts. She also acts as the central support point for the 28 NFL clubs across the U.S., which share weekly information, including statistics, roster changes and injury reports.

"My role here is an extension of what my career has always been — being involved in a lot of different areas," Oliveti says.

A native New Yorker, Oliveti admits she had little interest in the gridiron when she began consulting to NFL Properties on using computer

Continued on page 84

PROFILE: Mary Oliveti

ANDY FREEBERG

Position: *Manager of information processing, National Football League*
Mission: *Serving information needs at league headquarters and providing central network and technical support for 28 NFL teams*

Life after the pink slip: Starting the search

BY ALAN J. RYAN
CW STAFF

When information systems professionals suddenly find themselves out on the street after working for the same employer for years, the ensuing job search can be both stressful and frustrating. Add a tight employment market and rusty job search skills and the tension can be dizzying.

One way to reduce the stress is to brush up on interviewing skills and job search strategies, according to Brian Hoffman, vice-president and partner of MIS placement at Winter, Wyman & Co., a Waltham, Mass.-based job placement firm.

Hoffman's firm is offering a series of free classes for Boston-area IS professionals who have been affected by the changes in that region's economy. There are not lots of jobs to be offered in IS in Hoffman's region, "but we can share with them some tools, strategies and approaches they may use to help themselves continue to approach and chip away at the job market," he said.

The program is a series of skill sessions, such as resume preparation, job search and research strategies, interviewing skills and networking groups. What makes the classes different from any other job skills class is that the sessions are unique to IS professionals, Hoffman said.

The kinds of things the sessions will teach are important for all IS professionals seeking jobs, he said. One heavily stressed point is that the job seeker be aware of the currency of the technology he or she is familiar with, Hoffman said.

That means that when updating their resumes, job candidates should not waste space including information about expertise in outdated hardware and software. Instead, Hoffman said, the focus should be on their more current technical awareness.

"Some people at the senior level don't realize that it is important for them to display their current technical awareness, even though they aren't writing code any more," he said. If the candidate is familiar with the newer hardware and software developments, it should be included.

"These people are trying to attack a marketplace that is not that robust," he said.

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Former Primerica IS chief slides into Home

BY CLINTON WILDER
CW STAFF

NEW YORK — Continuing in the financial services industry where he achieved prominence at Primerica Corp., former Primerica information systems chief Thomas R. Gaughan joined The Home Insurance Co. as its top IS executive in December.

Gaughan was named senior vice-president and chief information officer at Home Insurance, the $2.5 billion property and casualty insurance unit of holding company Ambase Corp. The position had been open for six months since the resignation of Anthony Graffeo, who pursued another job opportunity.

Gaughan resigned from Primerica last year after the financial services firm's 1988 acquisition by Commercial Credit Corp. reduced many of his previous responsibilities [CW, Feb. 13, 1989].

A bevy of branches

Home Insurance has a centralized IS structure, with its New York corporate headquarters supporting 27 branch offices nationwide. Gaughan reports to John F. Sellick, executive vice-president of systems and operations.

At Primerica, much of the centralized IS responsibility had been dispersed to the firm's diverse business units. Primerica was also under heavy pressure to cut IS costs after the Commercial Credit acquisition.

Home's Gaughan

"Considering my financial services experience from the evolution of American Can to Primerica, [joining Home Insurance] was a logical progression to continue that," Gaughan said. He joined the former American Can Co. in 1982 and shepherded IS at the manufacturing company into the world of diversified financial services when the firm became Primerica in 1986.

Home Insurance has an IS staff of about 300, roughly the same size as American Can's IS department when Gaughan took over there. The firm is in the process of upgrading its central IBM 3084 mainframe to a 3090 and its departmental System/36s to Application System/400s, Gaughan said.

"I think there are significant opportunities to improve the IS support of the business, particularly as it relates to using new technologies," he said. Gaughan is setting up a group within IS to research and evaluate new technologies for application to the property and casualty business.

Before American Can, Gaughan worked in IS management at Standard Brands, Inc. and Celanese Corp. He holds MBA and undergraduate degrees from Drexel University in Philadelphia.

CALENDAR

Fifteen hundred data processing operations managers are expected to converge on Washington, D.C., in March for the Association for Computer Operations Management's (AFCOM) "Focus on Operations: In Pursuit of Progress" conference.

The conference, to be held March 19-22, will offer educational sessions on topics such as automated operations, operations technology and general management. In addition, more than 90 vendors are expected to exhibit their wares in a concurrent trade show.

For more information, contact AFCOM headquarters in Orange, Calif., at (714) 997-7966.

FEB. 4-10

Information Strategies and the Bottom Line. Laguna Niguel, Calif., Feb. 4-6 — Contact: *CIO Magazine*, Framingham, Mass. (508) 872-8200.

Telecom '90. Orlando, Fla., Feb. 4-7 — Contact: American Bankers Association, Washington, D.C. (202) 663-5430.

Communication Networks Conference and Exposition. Washington, D.C., Feb. 5-8 — Contact: IDG Conference Management Group, Framingham, Mass. (800) 225-4698.

National Forum on Computer Security. Miami, Feb. 7-8 — Contact: Carne Scott, Reston, Va. (703) 761-2333.

Systems 2X/400 Expo: Midrange Vendor Conference. Anaheim, Calif., Feb. 10-11 — Contact: National Productions, Salem, Mass. (508) 745-6010.

FEB. 11-17

Networld '90. Boston, Feb. 12-15 — Contact: H.A. Bruno, Englewood Cliffs, N.J. (201) 569-8542.

National Conference on Software Development. Washington, D.C., Feb. 13-16 — Contact: Conference Manager, U.S. Professional Development, Silver Spring, Md. (301) 445-4400.

Electronic Data Interchange Conference. Arlington, Va., Feb. 14-15 — Contact: Phillips Publishing, Potomac, Md. (800) 722-9120.

Motivating and Managing Computer Personnel. San Francisco, Feb. 14-15 — Contact: The Institute for Computer Capacity Management, Milpitas, Calif. (408) 954-0114.

Conference for Information Processing Executives. Atlanta, Feb. 15 — Contact: Kathy Collins, International Data Corp., Framingham, Mass. (508) 935-4258.

BOOK REVIEW

Waging all-out war for the hearts and minds of your customers

TOTAL CUSTOMER SERVICE
By William H. Davidow and Bro Uttal
Harper & Row, $19.95

Try to picture the common ground between the casual elegance of Liz Claiborne fashions and the "Bugs". Burger Bug Killers of Miami.

Then consider the same for computer giant IBM and Frito-Lay corn chips, or Singapore Airlines and Caterpillar farm tractors.

Each of those companies provides outstanding, even legendary, service to its customers, say William H. Davidow and Bro Uttal, co-authors of *Total Customer Service: The Ultimate Weapon.*

So buy this book, and you can too, right?

Not so fast. Davidow and Uttal caution readers from the outset that achieving a gleaming service reputation is a complex, expensive task that involves the sort of corporate cultural change many companies are unwilling to make.

"Most companies don't become service leaders through blind evolution," they write. "They have to try hard and keep trying. They labor under the burden of past mistakes."

It is in describing some of those "past mistakes" and in mining other rich anecdotal material that *Total Customer Service* strikes its best chords.

The authors succeed in taking a cliched yawner of a topic — who *isn't* out there declaring this the Year, the Decade or the Millennium of the Customer? — and make it zing with juicy anecdotes about famous companies.

Readers learn why Nordstrom, the chain of 48 fashion specialty stores with roots in the Pacific Northwest, is so famous for fine service. From its "no questions asked" return policy to sales representatives willing to run out and warm up your car in freezing weather, Nordstrom's top managers nurture a near-fanatical commitment to treating customers like a precious commodity.

To illustrate the dangers of an unfocused business strategy, there is the story of People Express Airline, which soared from three airplanes in 1981 to 117 aircraft by 1986 (when Texas Air bought it out).

Rapid overexpansion left the airline — dubbed "People Distress" in its waning days — scrambling to fill seats by pitching to businessmen, who hated no-frills inconveniences such as last-minute schedule changes.

The one off-putting note in this otherwise briskly written, entertaining book is all the Rambo talk. Business is a war, strafing and shattering the weaklings. The workplace is a battleground. Cost and price issues are skirmishes. We have seen the enemy, and he is overstatement.

Davidow is a marketing guru from California's Silicon Valley and author of *Marketing High Technology.* Uttal, now a technology management consultant, is a former member of the board of editors at *Fortune* magazine.

Like any self-respecting, how-to-save-your-business book, *Total Customer Service* delivers a step-by-step plan, which guides company executives through the daunting task of rethinking and recasting their service delivery.

A six-point plan, painlessly dissected and examined in individual chapters, covers strategy, leadership, personnel issues, product design, company infrastructure and measurement of success. Each chapter ends with three detailed "how to" instructions on topics such as setting strategy, ensuring solid product design and motivating employees.

There is quite a difference, for instance, between declaring your love for your customers and actually delivering a ring and a church date. "Employees at one company became so inured to management's constant stream of unsubstantiated slogans," the authors note, "that whenever they heard a new one they would whisper among themselves the cryptic acronym 'BOHICA' — 'Bend over, here it comes again.' "

Then there were the K Mart clerks admonished to say "Thank you for shopping K Mart" to every customer and reminded by the sticker on their cash registers that read "TYFSK." Many of them, annoyed no doubt by a management intent on measuring their performance through such nonsense, simply blurted out "TYFSK" to bewildered customers.

For companies already teetering on the brink of failure, this book has no comfort to lend. But a fundamentally sound business, the authors maintain, can afford the years of effort and the millions it could take to forge that "ultimate weapon" of faithful, contented customers.

Just in case you're not pumped up for combat by the book's conclusion, it leaves you with a cold little germ of a thought: "In the long term, service leaders destroy service followers."

MARYFRAN JOHNSON

Johnson is a *Computerworld* senior writer.

Coaching

FROM PAGE 79

time-sharing services in 1970. "If you asked the Properties staff, they'd tell you I didn't know what football was," she says. "The joke was that if you asked me what teams won, I'd give their code numbers."

Oliveti was, however, a Joe Namath fan, and the former New York Jets glamour boy is still pictured on her office wall in an old typewriter advertisement that reads, "Joe Namath is an Olivetti girl."

What Oliveti has always been a fan of is computer technology — and the ways in which it can be harnessed to serve users' information needs. "I enjoy the technical part of my job," she says. "In any area that I get involved in, I'm an analyst. I like to solve problems."

A recent example of that, Sullivan says, is a league proposal to add play-by-play game summaries to the information that teams share on the DEC network. "It was put on her desk for evaluation, and she could have easily just said yea or nay," he says. "Instead, she has taken a leading role in the project. She keeps coming up with new ideas about how to do things."

Before her NFL career, Oliveti applied her ideas as an IBM software consultant in fields ranging from electric utilities to churches. After majoring in mathematics at New York's Hunter College, she joined AT&T Long Lines as a scientific programmer in 1962. She became an independent consultant four years later, working for clients including the Federal Aviation Administration, Consolidated Edison, the Board of Missions of the Methodist Church and NFL Properties.

Oliveti joined the NFL in 1984, when the league was quickly ramping up its automation through an agreement with DEC, its official computer supplier. Two VAX 11/780s (now clustered with an 8550) anchor the league-wide network in a small data center adjacent to the office of NFL Commissioner Paul Tagliabue. At the 28 team offices, Microvax IIs and other systems use All-in-1 office software linked to headquarters via Decnet.

But Oliveti faces a greater challenge than simply networking remote office locations, because each team competes with 27 others in the office as well as on the Astroturf. The timely use of information — a player suddenly available to other teams through waivers, for example — can be as critical to success over the course of a season as a 50-yard bomb.

"Things are so competitive — it's very important that information arrives to each team simultaneously," Oliveti says.

Oliveti takes particular pride in her supporting role for individual teams' computing efforts. The Cleveland Browns DP staff, for example, has helped design software now used by other teams, and the Browns use a computer video package for game strategy. The Los Angeles Rams office employs a Microvax 3600 as a disk server for some 25 Apple Computer, Inc. Macintoshes sharing an Oracle Corp. database.

"What we've accomplished is having the clubs feel comfortable making computer moves on their own," she says. "Our purpose is to serve the clubs at their behalf — they have a resource to call if they need us. That's a very important role we play."

Oliveti foresees an explosion of computer technology in football in the next few years, as teams discover new uses of information in field strategy, coaching, scouting and training. "With the network, clubs are realizing how effective a tool it can be," she says. "Coaches do want to see game analysis on a computer. In the next five years, I think they will want to have it with them on the sidelines."

Working in the male bastion of professional football, Oliveti says her gender has never been an issue. "I've never felt any type of problem with that relationship," she says. "We have several women here in senior positions, as do the clubs, some of them in the DP area. Very simply, I'm here to do a job, and I do my job. During my career, DP itself has opened up quite a bit more to women."

MAINTENANCE PROVIDERS

They want your whole world in their hands

BY SUZANNE WEIXEL

Time was when all an IS manager involved with computer service had to think about was maintenance. If a product broke, he had to know who to call to fix it.

Welcome to the 1990s. Nowadays, a service call results in a lot more than a technician with a screwdriver. The definition of what service is and who provides it has been expanding rapidly, and it shows no signs of slowing down.

Services are now available that users only dreamed about two years ago. Manufacturers and independent service organizations that once offered maintenance-only contracts are now introducing programs for site planning, network management and disaster recovery.

In fact, IS managers can contract with a maintenance provider to do almost anything they would rather not do in-house, including applications programming, training and systems integration. They can even sign a deal with one company to do all their contracting.

Service providers are eager to find out what customers want and are moving quickly to bring it to market. "The customer has a lot more clout than he used to," says Joseph Trpik, editor of *AFSM International*, the journal for the Association of Field Service Managers.

A number of factors have conspired to put the customer in the driver's seat. First of all, there's the bottom line. Hardware maintenance, once a cash cow for both manufacturers and independent service organizations, is not generating the revenue it once did.

More and more players have entered the market over the past few years, and many hardware manufacturers that used to service just their own equipment have begun to compete aggressively for third-party business in hopes of both establishing new profit areas and extending their contacts with both current and potential hardware customers. All this activity has depressed prices and committed to distant memory gross margins in the 50% range.

JULIA TALCOTT

"Despite the fact that the overall industry shows a 7% net growth rate, the market and growth rate of hardware maintenance is essentially flat," says Richard Vancil, director of the Service Trends Program at Lexington, Mass.-based Ledgeway Group, Inc. "Even though product shipments will grow, that growth will be offset by lower maintenance revenue per box" because of more reliable equipment, Vancil says.

To make up the difference, many of the large computer service providers are scrambling to come up with new revenue-generating offerings. This includes manufacturers, which made up 70% of the market in 1989 — according to D. F. Blumberg & Associates, Inc., a market research firm in Fort Washington, Pa. — independent dealers, which made up 11%, and independent service organizations, which accounted for 19%.

This is not to say that everyone will be able to diversify. Hardware-maintenance-only providers that compete on a price basis will always exist, Vancil says. He puts these smaller, usually regional providers on the bottom of what he describes as a "U-shaped" industry.

Of the independent service providers, there are only a handful at the top of the "U" that can make the kind of investment necessary to offer the full range of services, Vancil says. "Trouble might be for any firms that are stuck in the middle," he says. It is this category that will likely undergo the biggest shakeout in the next couple of years.

Among the top tier of large national third-party service firms and equipment manufacturers, however, hardware maintenance is increasingly just the ante they need to get into the game. In 1988, Vancil notes, value-added services accounted for 20% of the $53 billion in revenue generated by computer maintenance, and since then, the trend has escalated.

"All future gains," Vancil predicts, "are going to come from software support, education and other professional services."

William E. Charlton, vice-president of marketing and business management operations for the customer service division of Bull H. N. Information Systems, Inc., agrees that the need to compensate for declining revenues is one reason maintenance providers are expanding their offerings. But, he says, it is not the only reason.

"It's no secret that hardware maintenance is a declining area in terms of profit," Charlton says. "But more important is the fact that customers' requirements are expanding. They are asking for value-added services."

Most observers agree that although maintenance providers have a vested interest in expanding their lines of business, enhanced service programs are also a response to a real need.

"Users know that a hardware mechanic can walk in and fix a box," Trpik says. "But they want someone who can be responsible for the total system — including sales, installation, maintenance, software support and education." In fact, he says,

Weixel is a free-lance writer based in Framingham, Mass.

INSIDE

Whole world

FROM PREVIOUS PAGE

interest in total system coverage is even being overridden by cost concerns.

Tom Willmott, vice-president at Aberdeen Group, Inc., a Boston-based consulting firm, attributes the rising interest in comprehensive service offerings to the increased burden of supporting distributed computing and the complex amalgamations of equipment it entails.

That rings true for Patrick G. Sullivan at American Airlines in Tulsa, Okla. Back in the days when a computer system consisted of a bunch of dumb terminals attached to a processor, "if something didn't work, you checked that the brightness knob was adjusted," says Sullivan, manager of communications maintenance and quality assurance at the airline. Now that systems have become more complex, users are turning to specialists to provide adequate service and support.

"It gets to a point where you have to ask yourself what business you're in," says Terry Frazier, group leader at Texas-based Dow Chemical Co.'s research and development computing, process modeling and expert systems operations, explaining why his company has started contracting out for more and varied services.

Although Dow is keeping project management and strategic planning in-house, some applications programming, local-area network software services and more and more hardware maintenance are being provided by outside sources.

For example, Frazier says Dow's decision to implement a Digital Equipment Corp. local-area network in 1987 was influenced by the software services DEC offered. "When we buy a local-area network," Frazier says, "it's also an advantage for us to buy the software services along with it. It gives us an inside track with the people who are doing the software development."

Contracting out for such basic support frees the in-house IS staff for strategic planning applications, Frazier says. "It's necessary just to keep up with changing technologies."

Donald F. Blumberg, president of D. F. Blumberg & Associates, says he sees a direct link between user environments that are more intricately networked and an increase in the types of service users require. "The user desperately needs someone who can act as both a service manager and a systems integrator," he says.

At Sorbus, Inc., a leading independent service organization, the trends toward increased system dependency and more complicated distributed environments have changed the company's approach to service, according to Janet Wallace, executive director of marketing.

Sorbus recently introduced the 3Xtra Support Program for IBM System/34, 36 and 38 customers. This service includes on-site customer support, cold-site disaster recovery services and a nationwide site relocation and installation service. It also includes a toll-free support hot line for fielding questions on subjects ranging from system configuration to the types of operating system utilities currently available. Wallace says Sorbus plans to develop the same sort of program for the other systems it covers.

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>
> DONALD F. BLUMBERG
> D. F. BLUMBERG & ASSOCIATES

Martin McHale, vice-president of Idea Servcom, an independent service organization in Tempe, Ariz., agrees with Sorbus' philosophy: "A vendor can't just be a minimum service provider any more. The customer's environment is so diverse, they are looking for us to provide a lot more," he says.

Idea Servcom has chosen networking as its targeted growth area. The company is developing its network maintenance offerings to include consulting services for system planning, network management tools and training.

IBM is positioning itself as a full-service provider of "everything from basic maintenance to running an entire facility," says Thomas Esposito, vice-president of marketing at IBM's National Service Division.

According to Esposito, the company makes a point of structuring its service offerings to allow customized service on an account-by-account basis. In fact, he says that many of IBM's standard offerings grew out of customized programs developed for individual accounts. "As individual situations proved successful, we migrated them into our standard services," he says.

In addition to introducing third-party maintenance, IBM now offers hot and cold sites for disaster recovery, direct end-user support for workstations and diverse software support services. It offers programs for site planning, installation and management, and it has developed tools that provide automated access to problem management systems as well as expert sytems for identifying and analyzing problems.

Alan Lindsay, MIS manager for the Consumer and Professional Products Division of The Grow Group, Inc., a packager of household chemicals in California, has three service contracts with IBM and is currently negotiating a fourth.

"We're not small enough or large enough to do our maintenance in-house efficiently," Lindsay says. The Grow Group tried using time-and-materials service from its independent reseller, but response time was not only slow, it was unreliable. Once the company upgraded to an IBM Application System/400, it was in dire need of more service and support.

"We installed the AS/400 in November of '88. We bought into IBM's System Xtra [a support package providing continuing on-site service for AS/400 software] in April of '89," Lindsay says. "Now when we have a problem, there's just one number to call, no matter whether it's hardware-, software- or communications-related."

Easing up

It's not just The Grow Group that is interested in simplification. Making day-to-day operations easier is what many customers want most. In addition to introducing new value-added services, service providers are answering customer demand for simplification with some variations on the standard types of service agreements.

"One-call-for-all" service arrangements, such as the one Lindsay mentions, are becoming fairly common. With this setup, a service provider handles inquiries of all types through one central number, usually a toll-free. This arrangement seems to have strong appeal for companies, even those with a do-it-yourself orientation.

For example, C. E. Moneymaker, director of operational services at Reynolds Metals Co. in Richmond, Va., has been wary of contracting out for services such as software support, which it has traditionally handled in-house. But the one-call idea is tempting to him.

"There are so many end users now, and they need someone to call with their questions," Moneymaker says. "It makes it easy if there's one 800 number that can handle it all."

Attempts are also being made to consolidate administrative paperwork through the creation of master contract forms.

IBM's Serviceplan, introduced in January 1989, replaced more than 25 individual contracts and introduced the concept of estimated billing. This option is intended to reduce administrative costs through single-invoice estimated billing. The understanding is that this is a master contract; other options can be added as needed.

Sorbus has also joined the paper-saving brigade. In April 1989, it came out with the Sorbus Service Agreement. This contract consolidates previous service offerings into one document and provides terms and conditions for standard on-site, carry-in/mail-in, deferred and hourly maintenance for over 400 brands of equipment. The firm was shooting for two goals: making an easy-to-understand contract and easing the incorporation of value-added services into the customer's maintenance programs.

At Idea Servcom, McHale says the company is experimenting on a customized basis with a master contract, on which it eventually plans to standardize. The contract is an attempt to simplify the addition of equipment to the form. In the past, he explains, every time a piece of equipment was switched in or switched out, an addendum was made to the contract, making the document unwieldy.

By this time next year, McHale expects that such contracts will be the rule rather than the exception. "I think you'll be seeing standard master contract arrangements developing across the industry in the next 12 months," he says.

Dow Chemical's Frazier says he would welcome almost anything that would ease the contract administration burden: "Sometimes, we spend as much as two person-weeks just getting a contract through our legal department. Anything that reduces the amount of paperwork involved would help," he says.

Encouraged by such positive responses to the ideas of simplification and consolidation, some service providers are now trying to extend those concepts several steps further by promoting an arrangement that would concentrate all service responsibilities

Net effect

Microcomputer service will be a staple of third-party maintenance by 1994, but the fastest-growing offering will be network services

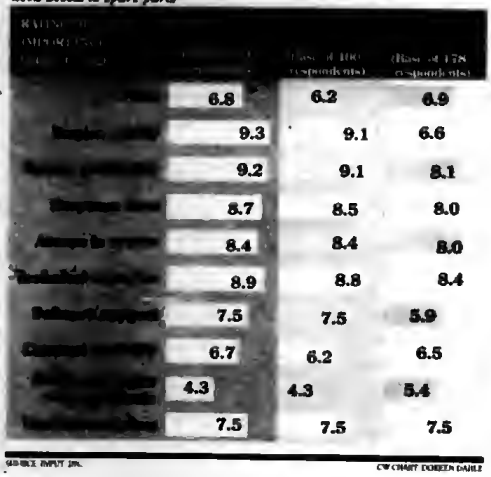
*Projected

SOURCE: D. F. BLUMBERG & ASSOCIATES

CW CHART: DOREEN DAILE

Class distinctions

Technical expertise far outweighed price concerns across the board; while large and midrange users have quality on their minds, small system users need access to spare parts



SOURCE: INPUT, INC.

CW CHART: DOREEN DAILE

in the hands of a "primary contractor."

Like a general contractor in the construction industry, a service company acting in this capacity would not necessarily provide all of the services itself but would select subcontractors for some functions, coordinate their activities and handle administration.

For the service vendor, being a primary contractor is a desirable situation. Even if it subcontracts out the work on equipment it cannot support itself, being the single point of contact gives the vendor a competitive advantage.

"It's a matter of account control," Ledgeway Group's Vancil says. "The vendor with primary contractor status is the one who stays on the cutting edge of identifying new business."

The benefits for the user are not so apparent, however. Although using a primary contractor alleviates the stress of dealing with multiple service providers, there

> "WHO KNOWS IF the subcontractor will provide the level of service I expect. I want more control than that."
>
> PATRICK G. SULLIVAN
> AMERICAN AIRLINES

are many who believe that this antidote has too many negative side effects to be used in anything but the most extreme situations.

Only companies with very complex integrated system environments should consider this, says Henry "Buddy" Stigler, manager of the Customer Service Program at Input, Inc., a Mountain View, Calif.-based market research firm. "In most cases, the customer is better off economically contracting for each individual service."

Independent service organizations, which have traditionally established the resources for servicing multivendor environments, tend to agree with Stigler. Sorbus' Wallace says her company acts as a single point of contact when a customer asks for it, but she finds that such situations are the exception rather than the rule.

Simple equation

Wallace says simplicity is the main attraction of the primary contractor arrangement. Not only does it minimize the number of people customers have to communicate with, but it also limits the amount and the type of paperwork involved. "There's one set of rules applied. They get one set of reports. There's no need to remember which company does business in which manner. It's uniform," Wallace says.

Idea Servcom's McHale says his company also will act as a primary contractor if a customer wants that setup; however, he believes that customers prefer service arrangements that can help them be more independent.

"A primary contractor arrangement simplifies service management for the customer by eliminating finger-pointing in a multivendor shop. But it creates problems, too," McHale says. He says the customer must constantly question the motives of the primary contractor to be sure he is getting the appropriate service. "There will be times when the primary contractor will look after his own interests before the interests of the customer," he says.

According to Vancil, any time a customer chooses to hand over administrative responsibilities, there will be a certain loss of objectivity as well as control. "It's really a leap of faith for the user," he says.

American Airlines' Sullivan says a primary contractor arrangement leaves too much room for error. In any situation where responsibility is handed off, Sullivan sees room for trouble. "It's like asking for a decreased level of service," he says. His concerns include what he sees as a built-in time delay: Once the customer calls in a problem, the primary contractor has to turn around and call the subcontractor.

For Sullivan, knowing exactly where his service is coming from is worth all the administrative effort involved in tracking a variety of providers. "Who knows if the subcontractor will provide the level of service I expect. I want more control than that," he says.

The 'house' wins

Vancil says that Sullivan is not alone. Rather than hand off responsibility for management of multiple service contracts to a primary contractor, he says, quite a few organizations are centralizing this task and putting it in the hands of an internal administrator. "We know of companies that are saving millions of dollars by having someone manage contracts in-house," Vancil says.

The decision of how to handle contracts is just one of many that IS managers will encounter when facing the maze of today's service options. As providers drop out, adjust their offerings or keep playing the same game, there is bound to be more confusion and even more options from which to choose.

But the consensus is that in the end, it is the user who benefits. "The competition is good for the user," Sullivan says. "There are more options to look at, and even though it might be more confusing, the end result is better uptime and faster restoral." If 1989 was any indication, IS managers can expect to be courted by the service industry well into the decade. •

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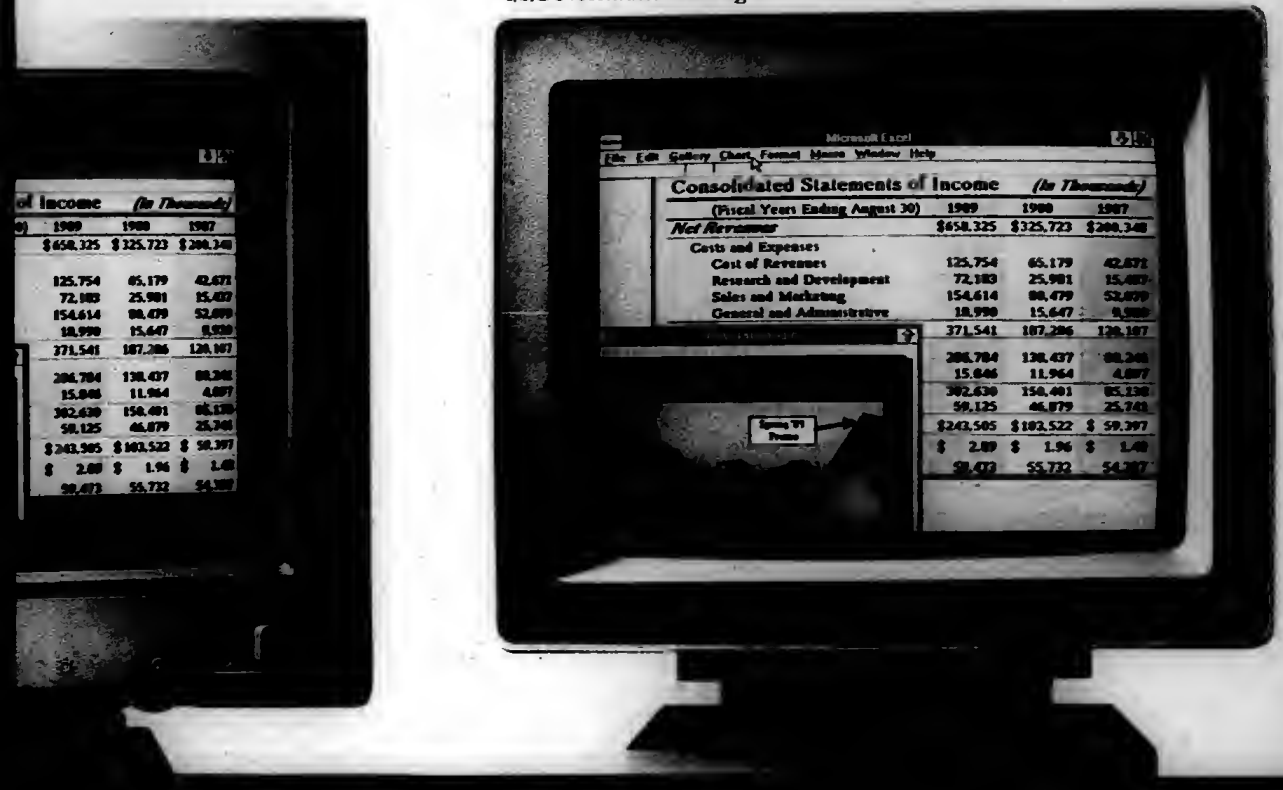

Nailing down the terms

BY JIM FERRIS

Two things every information systems manager would like to avoid are high computer maintenance bills and dealing with service hassles over the phone.

Both of these negatives can be minimized if you write a service contract based on your company's particular requirements. A good contract may not prevent every problem, but it will provide a solid foundation on which to negotiate.

The first point to pin down is response time. Remember that the shorter the response time, the higher the cost, since the vendor has to employ more technicians to provide quicker service.

By all means, be realistic about what kind of turnaround you need. I know of a company that missed an important deadline when its color plotter broke down and the service vendor didn't arrive until the next day. When the company complained, the vendor pointed out that its contract did not guarantee "same-day" service. "Of course," the vendor mentioned, "for 20% more we can provide four-hour response time. But you never requested it."

Fast response alone does not guarantee a fast fix, though. Quick dispatch is worthless if the vendor does not have the part you need. Get a guarantee that the vendor will stock critical parts locally.

Also, be sure to include a clause in your contract that requires "continuous effort." This means the technician will work on a problem until it is fixed, no matter how long that takes.

FIRST PERSON

I learned the value of this stipulation when a technician packed up and left on the dot of 5 p.m., leaving us with a still-malfunctioning printer.

A guarantee of continuous effort works best if accompanied by a well-defined procedure for problem escalation. What happens if the technician has not fixed the problem in a few hours? Does he call for help or just continue to "try things" while the clock ticks away? Without a contractual requirement that the technician call for help after a specified period, a problem can take much longer to resolve than necessary.

If yours is a single-vendor maintenance contract, in which one provider oversees the servicing of all your equipment, you'll want to go several steps further.

Because such arrangements span a variety of equipment and may include subcontracting, it is important to specify exactly how you want charges to be grouped and detailed. Otherwise, after a few equipment changes, it may be impossible for you to figure out from an invoice exactly what it is that you are paying for.

Invoice lessons

There are many ways to structure an invoice. If you have multiple sites, you may want to group equipment that way. Or maybe all your VAX hardware should be listed together. The main point is that when you look at the invoice each month, you should be able to logically check off each item. Keep in mind that many vendors won't be happy about coming up with the appropriate spreadsheet to accommodate your needs. You may need to push the point.

It is also a good idea to require the vendor to use a form when adding or deleting equipment. Keep copies of these forms in case a dispute arises as to what is and is not covered.

Although one benefit of single-vendor arrangements is that you know where to point a finger if something is clearly wrong, it isn't always easy to spot performance problems. With so much volume and so much activity, patterns can be hard to see.

One way of maintaining accountability is to require the provider to maintain a problem log at the vendor site in which the technician documents each problem he worked on.

While a committee can be very useful in working up a preliminary contract, it is best to have one person at the bargaining table. If the chosen vendor is not willing to meet all your requirements, some on-the-spot decisions and compromises will have to be made. One knowledgeable person vested with authority can do this much more efficiently than a group.

Be prepared to bend a little on some of your requirements and know which ones you can be flexible on. This can make the difference between coming up with a livable contact or no contract at all.

One area in which the vendor may be concerned is the continuous effort requirement. If you insert a clause specifying that you will place trouble calls immediately when a problem occurs rather than saving them up until the end of the day, the vendor will be assured that you won't abuse this stipulation.

It can take a lot of effort to design a good contract and negotiate it with one or more vendors. However, having a well-designed contract in place will reduce the amount of time you spend working out problems later. It should save you money, too. ●

Ferris is manager of equipment management at Oryx Energy Co. in Dallas.

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Why would you pay for live-in help?

BY ALEXIA MARTIN

On-site service technicians are as rare these days as live-in cooks. In the mid 1960s, "live-in" customer engineers were part-and-parcel of every hardware sale. Over the years, however, this arrangement — in which the servicer reports to work each day at the vendor site — has grown less popular.

One reason for the diminished interest is the fact that charges for this service option have escalated immensely. Richard Vancil, manager of The Ledgeway Group's Service Trends Program in Lexington, Mass., attributes this inflation to the increasingly rugged climate in the hardware maintenance industry. Forced to cut prices in basic services in order to compete, vendors are now operating on razor-thin margins, he explains.

To see any kind of profit, vendors must charge luxury rates for special options. This is particularly true in the case of a dedicated technician, Vancil adds, because the providers need to cover not only their out-of-pocket costs but the price of lost revenue potential. The result, he says, is that companies pay up to three times the break-even rate for a service engineer.

Price is not the only factor depressing interest in on-site service arrangements: Equipment diversification also makes the setup difficult to justify.

While companies used to buy from a single manufacturer — which provided a complete maintenance option covering CPUs, terminals and peripherals delivered by an on-site customer engineer — sites today are not that easily managed.

Most companies have CPUs from one vendor, network components from another, monitors from yet another and software from a wide variety of sources. One service engineer could not possibly master that degree of diversity.

Reliability factor

Another change is that hardware is considerably more reliable today than even five years ago. When it does break down, diagnostic and predictive tools for CPUs, network components and even some peripherals can catch problems before they become serious, sometimes "calling home" to a response center upon reaching potential problem thresholds.

With this capability, field engineers can be dispatched with the required parts almost before a system manager knows there is a problem.

Further, Vancil says, technology that fixes itself is on the horizon. For example, "self-healing networks" now exist that reroute communications around faulty nodes.

All in all, the need for live-in service is substantially reduced. Judy Hayner, marketing manager of Hewlett-Packard Co.'s Product Support Division, says that given today's support technology, the live-in service option is no longer a recommended option.

Still, having said all of this, situations do exist in which having a service technician on-site is a necessity.

If your company has stringent security requirements, for example, where security clearances are required for each employee, you may want tight control over each person who taps into the computer system. The National Aeronautics and Space Administration, with its security requirements, employs 27 on-site customer engineers.

If 100% uptime is a requirement to an organization's success — such as a hospital, a bank with an automated teller machine network or an airline — a full-time, on-site servicer may be

Martin is a Research Fellow at the Institute for the Future in Menlo Park, Calif.

worth the cost. American Airlines employs on-site customer engineers from most of the major manufacturers that supply it with equipment.

Sometimes, it is a sizable volume of hardware that can justify the cost of such an arrangement. There is no set size that determines whether to go with this option. Instead, manufacturers negotiate differently with each customer, according to representatives from IBM and Digital Equipment Corp.

One organization that chose live-in service providers based on volume is the University of California Lawrence Livermore National Laboratory in Livermore, Calif. Roy Braley, group leader for the Electronic Services Group, which services the lab's general instrumentation, portable and rack-mountable equipment as well as personal computers, says Lawrence Livermore offers various on-site options.

One agreement the lab has with DEC — which DEC calls a "high-density" approach — actually cut the cost of per-machine maintenance by 20%.

Braley says that with "8 by 5" (or nine-hour-a-day) coverage, it used to cost him $3,000 per year per Microvax to have every Microvax, printer and plotter on one master agreement.

The solution he reached with DEC was a customized contract in which the manufacturer put a field engineer on-site every day for two hours and charged a flat exchange rate. This option brought the cost of Microvax repair to around $600 per system. Other hardware manufacturers, such as IBM, provide similar coverage.

Larry Little, network supervisor in one of the lab's computer research departments, says there are drawbacks to live-in service. Besides cost, these include less control over the vendor's customer engineer as opposed to hiring your own, the possibility of getting a poorly qualified vendor technician and a high rate of turnover of vendor personnel. Firms with lengthy security clearances would find this especially crippling.

> "A NEW USER organization really needs the on-site maturity the vendor has."
>
> LARRY LITTLE
> LAWRENCE LIVERMORE

On the bright side, he says, vendor personnel are quite knowledgeable, with an easy pipeline into their company for problem-solving.

This knowledge is most valuable when a complex system is being installed. "A new user organization really needs the on-site maturity the vendor has," Little says.

There is also a way to reap the benefits of an on-site technician without paying the high premium. Sometimes, maintenance providers will waive the extra premium of on-site service in exchange for space that can be used as a base for servicing other area customers.

In return for the square footage to house a repair shop and warehouse spare parts, the maintenance provider swaps on-site service. Called "trading space," this practice has become common among larger firms.

Burleigh Cook, vice-president of Corporate Information Services at Syntex Corp., says his company has been providing space for its IBM costomer engineers for years.

"It's just good business to provide them with good space so that they want to be around," Cook says. "If they're here, we get high priority."

Tony Ruyter, business manager of Campus Computing at Caltech University in Pasadena, Calif., trades space with McDonnell Douglas Corp.

"We get an on-site engineer at our beck and call" in his office on campus or via electronic mail or a pager.

Though diminishing in popularity, the live-in option is still necessary and cost-justifiable in some situations. For those customers willing to pay the premium, the comprehensive support is there. ●

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VENDOR	YEARS IN BUSINESS	SITES SERVICED NATIONWIDE	U.S. AREAS FOR ON-SITE SERVICE	SERVICE HOURS[1]	HARDWARE SERVICED	NUMBER OF FIELD ENGINEERS	DISPATCH CENTERS	GUARANTEED RESPONSE TIME	SPECIAL OPTIONS	COMPUTERIZED DISPATCHING	CONSULTING/TRAINING	CONTRACT STYLE[2]	PENALTIES FOR CONTRACT CHANGES	WARRANTY AUTHORIZED	TYPES OF DISCOUNTS AVAILABLE	MINIMUM HOURLY RATES
Alms Data Systems, Inc. (201) 887-3600	8	2	N.J., N.Y.	24 hours/ 5 days	All DEC VAX, IBM System/36 and 38, AS/400	4	2	8 hours	Replacement parts guaranteed uptime, 24-hour on call loaner parts	Yes	Both	Time and materials	No	Yes	1% off if paid in full within 10 days	$55
ABS Associates, Inc (708) 397-8700	9	NP	50-mile radius of Chicago	8:30-5	DEC PDP 11/23, 11/73 AT&T 3B1 3B2	12	1	4 hours	Replacement parts loaner parts on site spares	Yes	Both	Time and materials basic maintenance premium on site standard on site depot	No	No	Multiyear yearly payment volume	$65
Accrum (602) 264-0288	8	NP	Southwest	8-5	Data General	15	1	8 hours	Replacement parts guaranteed uptime 24-hour on call loaner parts	Yes	Both	Time and materials, basic maintenance	No	Yes	15% off tm labor for dealers and VARs	$45
Accu-Tek Service, Inc. (313) 542-9960	3	350	Midwest	8-5	Altos 1000, 2000, Rexon Summit series	18	7	2-8 hours	Replacement parts guaranteed uptime 24 hour on call loaner parts facility management	Yes	Both	Time and materials basic maintenance customized	Yes additional charges are prorated over contract year	Yes	Annual quarterly, monthly payment discounts	$55
Adshh, Inc. (315) 656-3988	5	1	100-mile radius of Syracuse, N.Y.	9-5	IBM, Hewlett-Packard, Texas Instruments	3	1	4 hours	Replacement parts loaner parts	Yes	Neither	Time and materials basic maintenance	No	No	Volume	$50 depot/$70 on-site
Advanced Technology Services (309) 698-5100	5	14	Midwest to East Coast	7-6	All DEC	99	6	4 hours	Replacement parts 24-hour on call loaner parts	Yes	Both	Time and materials basic maintenance	No	Yes	Volume	$75
Alaska Datatronics, Inc. (907) 562-6133	15	300	Alaska	8-5	Data General, DEC, Icon, Wang	7	1	4 hours	Replacement parts guaranteed uptime 24-hour on call	No	Neither	Time and materials basic maintenance	No	No	Length of contract, volume	$65
American Computer Engineers (619) 587-9002	12	100	Southwestern U.S., Mexico	8-5	All DEC PDP 11, VAX series	6	1	2-4 hours	24-hour on call	Yes	Consulting	Time and materials basic maintenance	No	Yes	Government, schools, universities multiple sites volume	$50
Amtec Computer Stores, Inc. (515) 270-2480	12	NP	Nationwide	8-5	DEC, General Automation, IBM, NCR, Unisys, others	50	1	Negotiable	Replacement parts, guaranteed uptime, 24-hour on call loaner parts	Yes	Both	Time and materials basic maintenance contracts	Yes	Yes	Volume	$70
Bull H N. Information Systems, Inc. (617) 552-6000	30	NP	Nationwide	8-6	Amdek, Encore, HP, IBM, Texas Instruments	1,400	1	2 hours	24 hour on call 2 hour response time	Yes	Both	Time and materials basic maintenance premium	No	Yes	NP	Mainframes,$159 (8-6pm)-$191/ minicomputers, $118 (8-6pm)-$142
C. E. Services, Inc. (314) 641-0070	12	40	Dallas, Houston, Phoenix	24 hours/7 days	All IBM	NP	3	2 hours	Replacement parts, 24-hour on call	Yes	Consulting	Time and materials, basic maintenance	No	No	Multisite, volume	$75
Centurion Business Computers of San Antonio (512) 490-1171	15	100	San Antonio, Southern Texas	8-5:30	Altos 2000, NCR Tower	3	1	24 hours	24-hour on call	Yes	Both	Time and materials basic maintenance	No	Yes	Volume	$45-$110
C. P. R. Associates, Inc. (305) 372-8536	15	200	New England	8:30-5	All Wang hardware	15	1	2-4 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Both	Time and materials, basic maintenance	No	No	5% one year pre-payment	$90 first hour/$58 additional hours/$147 emergency service (2-hour min.)
Cirvis, Inc. (714) 891-2600	18	20	Southern Calif.	7-6	IBM Series 1	5	1	4 hours	Replacement parts 24-hour on call	Yes	Neither	Time and materials, basic maintenance	No	Yes	Up to 45% under manufacturer	$105
CMP Corp. (703) 360-9402	10	25	Nationwide	7-6	Over 18,000 products from over 40 vendors, including IBM, Control Data, Data General, Memorex, NAS, Unisys, Wang	40	5	4 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Both	Time and materials, basic maintenance, customized	Yes	Yes	Prompt payment	$55 (2-hour min.)
Coastal Electronic Maintenance (912) 353-1444	15	1	75-mile radius of Savannah, Ga.	8-6	DEC, IBM, HP, NEC, Texas Instruments, Unisys	6	1	4 hours	Replacement parts, guaranteed uptime, loaner parts	Yes	Both	Time and materials	Yes	No	Volume	$70
Computin, Inc. (412) 464-0275	10	150	Eastern Ohio, Southwestern Pa., Northern W. Va.	8-5	DEC PDPs, VAX	8	1	4-24 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts, media conversion	Yes	Both	Time and materials, basic maintenance, labor only, comprehensive, extended	No	No	2% off if paid within 10 days	$65 (contract), $75 (noncontract)
Computech (800) 545-1377	4	48	Hawaii	8-5	IBM 3000, 4300, NEC Astra	4	1	2 hours	24-hour on call	No	Consulting	Time and materials, basic maintenance	No	Yes	Multisite	$50
Computech Maintenance Services (918) 699-9141	13	2	Western Texas	24 hours/ 7 days	IBM System/34, 36, 38, Series 1, 4300	8	2	4 hours	24-hour on call	No	Neither	Basic maintenance	No	No	Volume	$120
Computech, Inc. (916) 638-2832	12	300	Ariz., Calif., Idaho, Mont., Nev., Ore., Wash.	8-5	Pick and firm machines	12	1	4 hours	Replacement parts guaranteed uptime, 24-hour on call, loaner parts	Yes	Both	Time and materials, basic maintenance	No	Yes	Length of contract	$100

[1]Monday through Friday, unless otherwise noted.
[2]Basic maintenance typically includes four-hour response time in standard working hours and all parts and labor.

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Further product information is available from the vendors. (Note that this chart does not include depot-only services.)

VENDOR	YEARS IN BUSINESS	SITES SERVICED NATIONWIDE	U.S. AREAS FOR ON-SITE SERVICE	SERVICE HOURS[1]	HARDWARE SERVICED	NUMBER OF FIELD ENGINEERS	DISPATCH CENTERS	GUARANTEED RESPONSE TIME	SPECIAL OPTIONS	COMPUTERIZED DISPATCHING	CONSULTING/TRAINING	CONTRACT STYLE[2]	PENALTIES FOR CONTRACT CHANGES	WARRANTY AUTHORIZED	TYPES OF DISCOUNTS AVAILABLE	MINIMUM HOURLY RATES
Computer CRT, Inc. (503) 626-6939	6	NP	Southwest Wash., Beaverton, Eugene, Portland, Ore.	8-5	DEC Microvax II, Wang MVP/OIS, 2200VS	3	1	4 hours	Guaranteed uptime, loaner parts, $300 minimum after-hour service, 24-hour depot expedition	No	Both	Time and materials, basic maintenance, depot repag	No	Yes	10% prepayment of yearly contract	$89 depot/$79 on-site (1-hour min.)
Computer Doctors (301) 474-3095	15	2	Washington D.C.	9-5	Compupro Machro Tech	4	1	1-24 hours	Replacement parts	No	Neither	Time and materials, basic maintenance	No	No	Preferred customer volume	$65 depot/$85 on-site/$125 immediate
Computer Field Services, Inc. (508) 664-2828	8	1	New England	9-5	CDC Data General, DEC, Wang	4	1	4 hours	Replacement parts, loaner parts, emergency spare parts and machines	No	Training	Time and materials, basic and preventive maintenance	One month maintenance fee without 30-day written notice	No	Prepayment of annual contracts	$80
Computer Hardware Maintenance Co. (215) 752-2221	20	25	Del., N.J., N.Y., Pa.	24 hours/7 days	IBM 4300 AS/400 System/34, 36, 38	47	1	2-4 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Both	Basic maintenance	No	Yes	20% under manufacturer	$95
Computer Maintenance & Consultants, Inc. (703) 569-2626	6	65	N.Y. to Richmond, Va.	24 hours/7 days	AT&T, DEC, HP, IBM, Unisys	6	1	4 hours	Replacement parts, 24-hour on call, loaner parts	Yes	Consulting	Time and materials, basic maintenance	No	Yes	Contract renewal, volume	$65
Computer Maintenance Corp. (404) 449-3320	10	NP	Nationwide	24 hours/7 days	All DEC hardware Unisys 1100 series	NP	8	1-2 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Consulting	Time and materials basic maintenance, support	No	No	25% or greater off OEM price	$100
Computer Network Services, Inc. (706) 863-1640	3	61	50-mile radius of Chicago	24 hours/7 days	Unisys 930, Systeth 80 Models 3-8	4	1	4 hours	Guaranteed uptime, 24-hour on call, loaner parts	Yes	Consulting	Time and materials, basic maintenance, labor only	No	No	Educational, nonprofit organizations	$40 depot/$60 on-site
Concurrent Computer Corp. (201) 758-7000	20	1,800	Nationwide	8-5	Data General Nova, General Automation, Interdata, Masscomp Perkin-Elmer	500	1	8 hours (2 and 4 available)	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Both	Time and materials basic maintenance, comprehensive, resident	No	Yes	Prepayment volume	$175 (3-hour min.) $200 (outside workday)
Continuity Corp. (713) 957-3839	5	250	Houston, San Antonio, Southern Texas, Kansas City, Kan.	8-5	Wang VS, OIS, 2200	7	1	4 hours	Replacement parts, loaner parts	Yes	Both	Time and materials, basic maintenance	No	No	None	$98
Cosmic Enterprises, Inc. (508) 435-6967	11	200	Mid-Atlantic, New England, Southern Fla.	8-15-5	DEC PDP Microvax 8000 series	10	2	4 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts, depot repair	Yes	Both	Time and materials basic maintenance	No	No	Educational, government, municipalities volume	$75 (2-hour min.)
Data Equipment Services, Inc. (301) 444-0500	12	120	Washington, D.C., Md., Northern Va., Southern Pa.	8-5	DEC PDP-11, Microvax II, 3000, VAX-11/700 series	8	1	4 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	No	NP	Time and materials, basic maintenance, extended coverage	No	No	Prepayment, volume	$100
Datatronics, Inc. (402) 330-3293	12	500	Eastern Neb., Southeastern S.D., Western Iowa	8-8	IBM System/34, 36, 38, 4300 series	7	1	4 hours	Replacement parts, guaranteed uptime, 24 hour on call, loaner parts	Yes	Both	Time and materials, basic maintenance	No	Yes	Volume	Minicomputers: $90; mainframes, $160
Decade Computer Services, Inc. (305) 973-3590	10	600	Southeast U.S.	8-8	DEC PDP-11, all VAX	20	1	8-8 hours	Replacement parts, 24-hour on call	Yes	Consulting	Time and materials, basic maintenance, premium maintenance	No	Yes	Educational, government, prepayment, contract length	$70
Decision Data Service, Inc. (800) 654-3374, Ext. 6000	21	35,000	Nationwide	8-5	DEC PDP 11, Microvax II, VAX-11/700 series, IBM System/34, 36, 38, Texas Instruments 990, Business System, Wang 2200, VS, OIS	900	1	None	Replacement parts, loaner parts, depot	Yes	Both	Time and materials, basic maintenance depot	No	Yes	Central point of billing, Help desk, multiyear	$150
Digital Equipment Corp. (508) 870-3111	33	NP	Nationwide	8-5	1,000 products from over 200 vendors	NP	450 service locations, 14 customer support centers	2-24 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Both	Basic maintenance	No	Yes	Volume	$99-$150
Dilog (714) 937-5700	11	500	Nationwide, Puerto Rico	8-5	DEC Microvax, PDP 11 series	30	2	4-8 hours	Replacement parts, guaranteed uptime, loaner parts, 12-hour coverage	No	Both	Time and materials, basic maintenance	No	Yes	Volume	NP
EMF, Inc. (603) 353-8400	16	600	New England, upstate N.Y.	9-5:30	Unix platforms	12	1	2-16 hours, (8 typical)	Replacement parts, 24-hour on call, loaner parts	Yes	Both	Time and materials, basic maintenance	No	Yes	Multiyear, two-day response, volume	$95 (2½-hour min.)
F. E. Pro, Inc. (612) 644-4399	9	150	Nationwide	7-6	Data General, DEC	15	2	4 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts, swap, new equipment sales	No	Consulting	Time and materials, basic maintenance	No	No	Extended term, government, volume	$90 (1-hour min.)
GE Computer Service (800) 543-0440	23	1,500	Nationwide, Puerto Rico	8-5	DEC, Data General, IBM, Texas Instruments, Prime, 4 Data	800	1	4 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Training	Basic maintenance	No	Yes	Corporate discount, volume	$110

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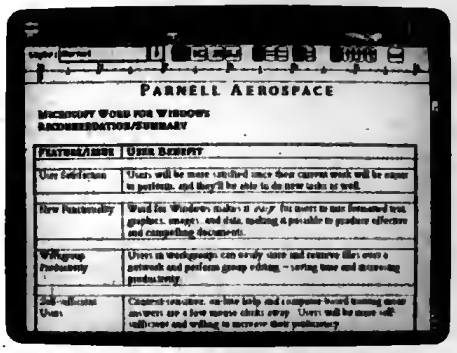

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VENDOR	YEARS IN BUSINESS	SITES SERVICED NATIONWIDE	U.S. AREAS FOR ON-SITE SERVICE	SERVICE HOURS[1]	HARDWARE SERVICED	NUMBER OF FIELD ENGINEERS	DISPATCH CENTERS	GUARANTEED RESPONSE TIME	SPECIAL OPTIONS	COMPUTERIZED DISPATCHING	CONSULTING/TRAINING	CONTRACT STYLE[2]	PENALTIES FOR CONTRACT CHANGES	WARRANTY AUTHORIZED	TYPES OF DISCOUNTS AVAILABLE	MINIMUM HOURLY RATES
Grumman Systems Support (516) 683-6300	15	NP	Nationwide	8-5	All Data General, DEC PDP, VAX, 11/700, 6300, 8200, 8300, 8500, 8600, 8700 series, Vaxstation; IBM 3250, 5080, 4300 series	350	1	4 hours	Replacement parts, guaranteed uptime, 24-hour tac call, loaner parts, on-site field engineer, on-site parts	Yes	Both	Time and materials, basic maintenance, customized contracts	No	Yes	Prepayment, site, volume	$95
Halifax Engineering, Inc. (703) 658-2452	21	200	Nationwide	24 hours/ 7 days	Data General, DEC IBM, HP Tandem	79	4	2 hours	Replacement parts guaranteed uptime, 24-hour on call, loaner parts	No	Neither	Time and materials basic maintenance	No	No	None	$50
Harmon Computer Service (714) 250-5180	13	5	Southern Calif.	8-5	Data General Eclipse, Nova	5	1	4 hours	Loaner parts	No	Neither	Basic maintenance	No	No	No	$75
Hitachi Data Systems (408) 970-1000	12	1,200	Nationwide	24 hours/ 7 days	IBM 3080 series, 4300	400	6	2-24 hours	Replacement parts, guaranteed uptime 24-hour on call	Yes	Both	Basic maintenance, critical support	Varies by contract	Yes	None	$219
Ideo Services, a division of Ideo Courier, Inc. (800) 538-1400	20	40,000	Nationwide	8-5	Datapoint; IBM 4300, System/ 34, 36, 38; Wang 2200	450	1	2 hours	Replacement parts, guaranteed uptime, 24-hour tac call, loaner parts	Yes	Both	Shared risk (discount based on estimated number of service calls per year)	No	Yes	Volume location of site	$60 depot/$115 on-site
Integrated Automation, Inc. (404) 325-8100	13	450	Nationwide	8-5	DEC PDP-11, Honeywell 316, 516, 716	800	1	2 24 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Both	Time and materials, basic maintenance	Yes	Yes	Contract, relative location, volume	$84
Integrated Computer Services, Inc. (816) 960-1031	9	1	Southern Calif.	8:30-5	IBM, Texas Instruments	10	1	8 hours	Replacement parts, guaranteed uptime, loaner parts.	Yes	Both	Time and materials, basic maintenance, preventive maintenance	No	Yes	Volume	$65 labor/$50 travel
Integrated Systems Group (800) 847-5800	28	NP	Ariz., Calif., N. Mex., Southern Nev.	8-5	DEC PDP-11, VAX, Microvax; General Automation; Unisys	25	1	4 hours	Replacement parts, guaranteed uptime, 24-hour on-call, loaner parts	Yes	Both	Time and materials, basic maintenance depot	No	No	NP	$55 depot/$80 on-site
Intelogic Trace, Inc. (800) 331-7160	5	NP	Nationwide, Alaska, Hawaii, Puerto Rico	8-5, 24 hours/7 days (IBM sites only)	Datapoint; IBM System/34, 36, 38, AS/400, Series 1, 3270; Wang OIS/VS	640	1	4 hours on-site guarantee, 12-hour fix guarantee (IBM products)	Replacement parts, guaranteed uptime, 24-hour tac call, loaner parts	Yes	Both	Time and materials, basic maintenance shared risk	No	Yes	Multiyear, prepayment density, volume	$135 (1-hour min.)
IO Systems, Inc. (818) 787-8000	7	250	Calif.	8-5	Prime 50 series, Wang VS series	15	1	4 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	No	Both	Time and materials, basic maintenance	No	No	Volume	$90 (2-hour min.)
ISC-Bunker Ramo, an Olivetti Co. (800) 556-6065	60	NP.	Nationwide	8-5	Unix, Pick platforms	550	2	2-8 hours	Replacement parts, 24-hour tac call, loaner parts	Yes	Both	Time and materials, basic maintenance	No	Yes	Length of contract, level of service, volume	$80
Jantec Computer Group (714) 997-8927	7	400	Southern Calif.	24 hours/ 7 days	All DEC hardware	15	1	4 hours	Replacement parts, 24-hour on call, loaner parts	Yes	Both	Time and materials basic maintenance	No	Yes	Multiple system, prepayment	$85
LDI/Prompt Computer Support Group, Inc. (216) 248-3800	8	250	Fla., Ohio, Pa.	8-5	All Unisys, DEC	31	5	2 hours	Replacement parts, guaranteed uptime, 24-hour tac call, loaner parts, backup equipment	Yes	Both	Time and materials, basic maintenance	No	No	Depot, quantity	$115 on-site
Logical Solutions Co., Inc. (207) 892-7536	11	400	Northeast U.S. to Washington, D.C.	8-5	Data General	20	2	NA	Replacement parts, 24-hour on call, loaner parts	Yes	Both	Time and materials, basic maintenance	No	Yes	None	$50 depot/$60 on-site
Mantech (800) 426-8234	18	500	Nationwide	8-8	DEC PDP-11, Microvax, Vaxstation, VAX-11/700, 6000, 8000 series	NP	2	4 hours (2 hours available)	Replacement parts, guaranteed uptime, 24-hour tac call, loaner parts	Yes	Both	Time and materials, basic maintenance, guardian and transitional programs	No	Yes	NP	$100 ($125 weekends, holidays)
Maintenance, Etc. (713) 520-6567	4	32	Houston	24 hours/ 7 days	MAI Basic Four, obsolete and foreign computers	2	1	4 hours	Replacement parts guaranteed uptime, 24-hour tac call, loaner parts, disaster-recovery protection	No	Consulting	Time and materials, basic maintenance	No	No	Quarterly anti yearly up to 10%, volume	$75
Martin Urling, Inc. (717) 697-7586	10	20	Central Pa.	8:30-5	Prime Tower	1	1	4 hours	Replacement parts	No	Both	Time and materials, basic maintenance	No	Yes	None	$65
McDonnell Douglas Field Service Co. (800) 826-4944	20	5,000	Nationwide, Hawaii, Puerto Rico	8-5/365 days	All DEC except 6000, 9000 series, Tandem	550	1	4 hours	Depends on contract style	Yes	Both	Basic maintenance, critical coverage	No	Yes	Annual prepayment, volume	$125
Midwest Service Management (800) 466-8113	7	2	Central and Southern Ohio, Northern Ky.	8-5, 10-4 (Saturday)	Altos	6	2	8 hours	Replacement parts, loaner parts	No	Both	Time and materials	No	Yes	Volume	$45
Monterey Computer Consulting (408) 646-1147	10	45	Monterey Peninsula, Calif.	8-5	IBM	2	1	Up to 24 hours	Replacement parts, loaner parts	No	Both	Time and materials, basic maintenance	Negotiable	Yes	10% annual prepayment	$80 depot/$80 on-site

Just three years ago, Compaq fired the shot heard around the world.

Now for the

In September 1986, Compaq introduced a personal computer that changed people's ideas about what a PC could do.

The COMPAQ DESKPRO 386 Personal Computer was the first PC based on the powerful 386 microprocessor. It gave people the speed and power to do more than ever before. It pushed out the envelope of technology. But did it in a way that let users continue to work with industry-standard software and hardware. With it, Compaq set a new standard in PC performance.

Compaq has done it again.

Introducing the COMPAQ DESKPRO 486/25 Personal Computer and COMPAQ SYSTEMPRO Personal Computer System.

Once again, Compaq has expanded the role of the PC—to meet the most demanding needs of both single and multiple users. And once again, Compaq has pushed out the envelope of technology to deliver new levels of performance and expandability, without sacrificing compatibility.

sonic boom.

These new computers were designed from a simple observation: People use computers differently. One user using a PC has different needs than a group working together on a network or multiuser system.

The COMPAQ DESKPRO 486/25 is for the individual whose job depends on a PC. It was designed from the ground up to unleash the power of the evolutionary new Intel 25-MHz 486 microprocessor.

The COMPAQ SYSTEMPRO delivers an unprecedented combination of system performance and expandability to networks and multiuser systems. Its breakthrough design gives users the flexibility to work with both 33-MHz 386 and future 33-MHz 486 technology. It also provides the unmatched capability to work with multiple processors.

Inside both you'll find advances like cache memory designs that boost processor performance. Extended Industry Standard Architecture *(Extended ISA* or *EISA)* that accelerates input/output performance while maintaining compatibility. New drive and controller technology that increases fixed disk performance and reliability. And that's just the beginning of this story.

Compaq introdu

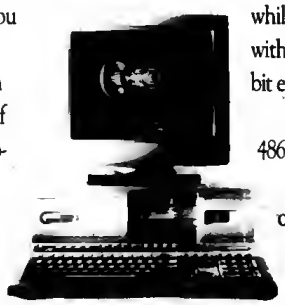
As PC technology has evolved, Compaq has been consistently among the first to tap its power. Now with the COMPAQ

DESKPRO 486/25 and the COMPAQ SYSTEMPRO, Compaq brings new levels of performance to single and multiple users.

THE COMPAQ DESKPRO 486/25: THUNDEROUS PERFORMANCE.

For individual power users, nothing compares to the new COMPAQ DESKPRO 486/25 Personal Computer. It will let you work faster than ever before.

Every component has been designed to unleash the power of the new Intel 25-MHz 486 microprocessor. Power that drives numeric-intensive applications up to three times faster than 25-MHz 386-based PCs, outpacing many technical workstations.



The COMPAQ DESKPRO 486/25 was designed from the ground up to unleash the power of the 25 MHz 486 microprocessor.

It's power you can put to work on the most demanding applications. To handle CAD/CAM/CAE, statistical analysis, portfolio modeling, project management and multitasking.

The Intel 25-MHz 486 microprocessor is the heart of the system. Its breakthrough design integrates the processor with a numeric coprocessor (to speed number crunching) and an 8-Kbyte cache (to reduce wait states).

To boost performance further, Compaq added a second-level cache memory controller with 128 Kbytes of high-speed static RAM. Combined with interleaved memory architecture, it lets your data fly between the microprocessor and memory.

The 486 works in concert with COMPAQ Flex Architecture, which integrates a processor/memory bus with the new EISA I/O bus. This enables information to be processed at the highest possible speed while maintaining compatibility with 8-, 16- and powerful new 32-bit expansion boards.

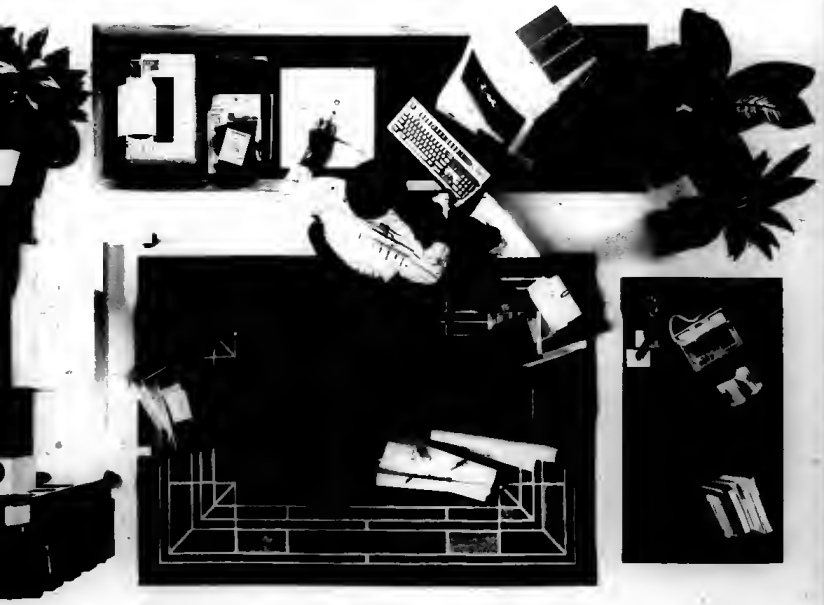
The COMPAQ DESKPRO 486/25 is open for customization.

Four megabytes of memory are standard, so you can run applications under MS OS/2 Version 1.2, MS-DOS or UNIX operating systems.

If you need more, you can expand memory up to 100 megabytes using a separate high-speed 32-bit memory slot. That leaves up to seven EISA slots free for your choice of expansion boards.

You can work with up to seven internal storage devices, choosing from a range of high-performance, high-capacity fixed disk

uces performance For one.

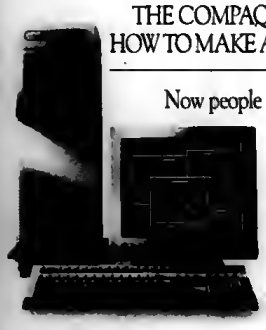


ves (the 650- and 320-MB models have 1:1 interleave and ESDI controllers). All told, you can e up to 1.3 gigabytes ata internally, p to 2.6 gigabytes g the optional MPAQ Fixed Disk Expansion Unit. Compaq didn't stop there. Accelerated VGA graphics are built in, giving you a crisp, colorful display and freeing an expansion slot. The system even has a socket for an optional Weitek 4167 coprocessor to blaze through calculations.

You can run the most complex CAD/CAM/CAE, scientific and business applications faster than ever before

The COMPAQ DESKPRO 486/25. It's sure to bring a little thunder to your office.

that will have busi
And all.



THE COMPAQ SYSTEMPRO:
HOW TO MAKE A CROWD ROAR.

Now people who work together can work faster than ever before.

The new COMPAQ SYSTEMPRO: an unprecedented combination of performance and expandability for multiple users

Every aspect of the new COMPAQ SYSTEMPRO has been engineered to bring unprecedented total system performance and expandability to demanding connected environments.

EIS

It's an ideal server to handle advanced local area networking. To take advantage of new client-server applications like shared databases. And to manage multiuser transaction processing.

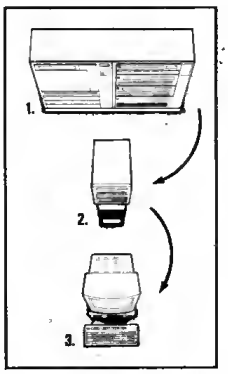
ness booming.

Inside, you'll find a series of technological breakthroughs.

The first is a flexible system processor design that lets you work with both 33-MHz 386 and future 33-MHz 486 technology.

Initial models offer a 386/33 system processor that employs a 386 microprocessor optimized with a 64-Kbyte cache memory design and a socket for optional coprocessors. This drives software more than twice as fast as the IBM PS/2 Model 80, and surpasses most minicomputers.

Computing potential can be increased up to four times by adding a second system processor. You can use two 386 processors now. Or work with a 386 and a 486, or two 486 processors in the future. So your investment is protected.



The COMPAQ SYSTEMPRO is a powerful network server and mainframe gateway, giving users the fastest access to departmental and mainframe data

The multiple system processors are integrated into COMPAQ Flex/MP Architecture, which combines a separate processor/memory bus with the EISA I/O bus.

EISA delivers the fastest I/O performance, which is critical for data sharing.

You can add up to six 32-bit network interface controllers for maximum server throughput. And you're ensured compatibility with 8-, 16- and 32-bit boards.

Users gain nearly instant access to fixed disk data with innovative drive array technology that transfers data up to four times faster than nonarrayed drives. It also supports the most comprehensive range of data protection features.


The COMPAQ LAN MANAGER 386/486 optimizes the COMPAQ SYSTEMPRO for use in OS/2-based networks

As you add more users and more complex applications, the COMPAQ SYSTEMPRO grows right along with you. It's the first PC to actually increase in performance when you add options like system processors or drive arrays.

It grows in other ways that are simply amazing. You can expand the 4 megabytes of standard RAM to 256 megabytes, use up to 11 expansion boards, work with 11 storage options and store up to 4.28 gigabytes of data.

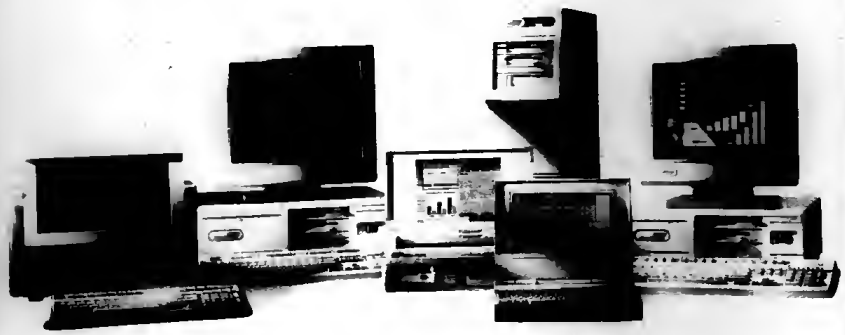
You're also free to work in your choice of network and multiuser operating system. This includes Novell NetWare 386, SCO UNIX System V/386, new COMPAQ LAN MANAGER 386/486 and others.

The COMPAQ SYSTEMPRO. Get your group together, and watch them roar.

COMPAQ

It simply works better.

When it comes to performance, we believe actions speak louder than words.



Since we introduced our first personal computer in 1983, no other computer company has delivered PCs with the technical excellence of COMPAQ PCs.

Today Compaq offers a full line of high-performance personal computers. Desktops based on 286, 386 and now 486 processor technology. Portables and laptops. And our new PC system, customized for multiple users.

In every COMPAQ personal computer you'll find innovative technology. Along with plenty of common sense. Like the ability to run the world's largest library of industry-standard software. And the room to add the peripherals your job demands.

This combination of technical leadership and practical thinking is why COMPAQ PCs consistently earn the highest marks for quality from computer experts. And unsurpassed marks for satisfaction from users.

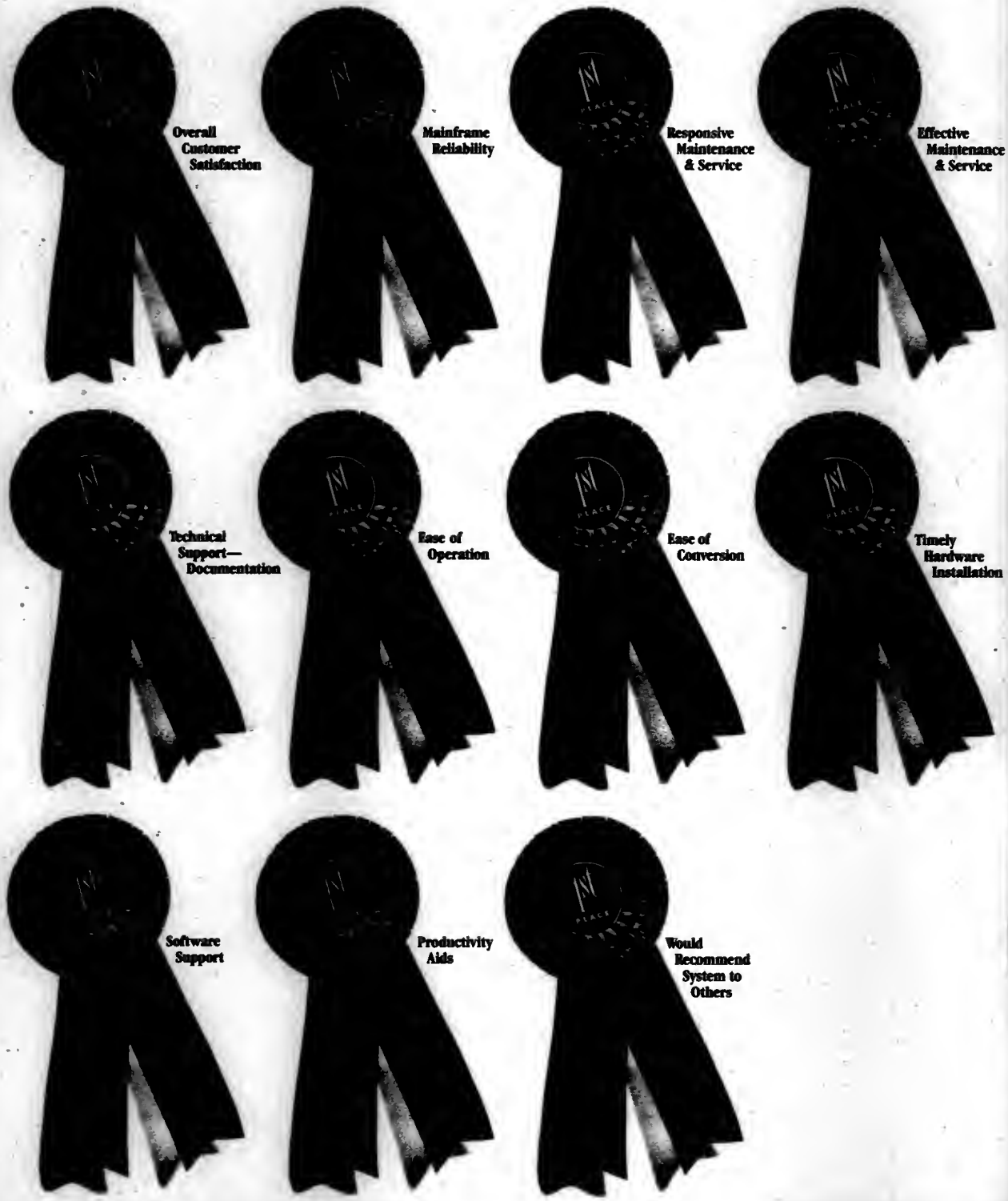
Standing behind every COMPAQ PC is a worldwide network of Authorized COMPAQ Computer Dealers. Your dealer is trained to help you build powerful computing solutions. For the location of your nearest dealer and free information, call 1-800-231-0900, Operator 107. In Canada, 1-800-263-5868, Operator 107.

COMPAQ

It simply works better.

VENDOR	YEARS IN BUSINESS	SITES SERVICED NATIONWIDE	U.S. AREAS FOR ON-SITE SERVICE	SERVICE HOURS[1]	HARDWARE SERVICED	NUMBER OF FIELD ENGINEERS	DISPATCH CENTERS	GUARANTEED RESPONSE TIME	SPECIAL OPTIONS	COMPUTERIZED DISPATCHING	CONSULTING/TRAINING	CONTRACT STYLE[2]	PENALTIES FOR CONTRACT CHANGES	WARRANTY AUTHORIZED	TYPES OF DISCOUNTS AVAILABLE	MINIMUM HOURLY RATES
Motorola, Inc. Computer Group, Field Service Division (800) 444-8649	20	18,000	Nationwide	8-5	Convergent, Prime, Sigma Design	750	2	2-4 hours, next day	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Both	Time and materials, basic maintenance	No	Yes	Centralized billing, call screen, contract, multiyear, prepayment, volume	$90 (2-hour min.)
National Computer Service, Inc. (404) 881-8828	4	175	Nationwide	8-6	DEC PDP-11 series, VAX, IBM System/34, 36, 38, Series 1, Unix; Xenix	215	1	4 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Both	Time and materials, basic maintenance	No	Yes	Volume	$75
National Customer Engineering (619) 483-7974	9	2,000	Nationwide	8-5	Altos, General Automation, CIES, ADDS, NCR, Scan Optics, McDonnell Douglas	75	1	4 hours (typical)	24-hour on call	Yes	Training	Time and materials, basic maintenance, depot	No	Yes	Prepayment, site, volume	$95
NCR Corp. (513) 445-4700	105	450	Nationwide	8-5	Over 1,000 products from over 175 manufacturers	10,000	1	4 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts, customized	Yes	Both	Time and materials, basic maintenance	No	Yes	Customer participation, density, volume	$91 (1-hour min.)
NETS Electronics, Inc. (603) 432-0700	10	140	Mid-Atlantic, Northeast	24 hours/ 7 days	Data General Nova 1200, MV 200, DG10; IBM Series 1, 3651	28	2	4 hours	Replacement parts, 24-hour on call, loaner parts	Yes	Both	Basic maintenance	No	Yes	Volume	$80
O-Tech Computer Service (214) 340-0978	10	3	Northern Texas, Okla.	8-5	Texas Instruments 990, 1500	7	3	8 hours	Replacement parts, 24-hour on call, loaner parts	No	Neither	Time and materials, basic maintenance	No	Yes	2% off price if paid within 10 days	$75 (2-hour min.) on-site
OTW, Inc. (508) 520-0250	6.5	25	Nationwide	9-5	All Prime	2	1	4 hours	Replacement parts, loaner parts	No	Both	Time and materials, basic maintenance	No	No	Volume	$75
Peregrine, Inc. (408) 749-9444	5	60	Calif., Dallas, Washington, D.C	9-5	All IBM	20	3	2 hours	Replacement parts, 24-hour on call loaner parts, depot, parts repair	No	Both	Basic maintenance	No	No	Low usage, volume	$140
R&M Associates (201) 440-8585	17	6,000	Conn., Del., N.J., N.Y., Pa.	8-5	DEC Microvax, PDP-11, VAX series	35	1	4 hours	24-hour on call, loaner parts	Yes	Training	Time and materials, basic maintenance	No	Yes	Annual prepayment, volume	$75-$95
Pro Systems, Inc. (401) 463-5700	10	200	Mass., R.I.	8-5	All Prost 4 Data, Unisys 800/20, 800/25	4	1	4 hours	Replacement parts, loaner parts	Yes	None	Time and materials, basic maintenance, depot	No	Yes	Annual prepayment	$60 depot/ $110 on-site
Reynolds & Reynolds Co. (513) 443-2124	25	83	Nationwide	8-5	NCR Tower, Tandon	110	4	4-8 hours	Replacement parts	Yes	Both	Time and materials, basic maintenance	No	Yes	Volume	$85
Rodax, Inc. (206) 885-9999	6	NP	Pacific Northwest, Alaska	8-5	Prost 4 Data Mark 2 3, 4, 5, 8, 9, 11, Wang VS, 2200, OIS	8	1	4 hours	Replacement parts, 24-hour on call, loaner parts, variable rate contracts	Yes	Consulting	Time and materials, basic maintenance	No	Yes	Annual quarterly prepayment	$60 depot
Sage Computer Resources (800) 876-0046	6	50	Southern, Western	7-6	DEC VAX-11/700, 8600 series; Honeywell DPS 6 and 8; Wang VS, OIS	21	1	4 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Consulting	Time and materials, basic maintenance	No	Yes	Length of contract, multisite, volume	$95 (2-hour min.)
Service & Training, Inc. (800) 922-9620	6	125	East, South, West	24	All Data General	22	1	2-4 hours	Replacement parts, guaranteed uptime, 24-hour on call loaner parts, depot	Yes	Both	Time and materials, basic maintenance, extended, depot	No	Yes	Prepayment, volume	$85
Sirius Computer Service, Inc. (714) 986-3239	10	6	Calif., Minn.	7-6	All Data General, Wang	16	1	4 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Both	Time and materials, basic maintenance	No	NP	Multiyear, prepayment, volume	$75
Sorbus, Inc. (800) 767-2877	30	40,000	Nationwide, Hawaii, Puerto Rico	7-6	All IBM hardware, DEC Microvax I, II, VAX-11/700 series, VAX 800; PDP-11 series	900	1	2 hours	Replacement parts, guaranteed uptime, 24-hour on call, install/relocate	Yes	Yes	Time and materials, basic maintenance, dealer agreement	No	Yes	Annual prepayment, Help desk, single-site, volume	Mini: $124 (contract) $138 (non-contract); mainframes: $187 (contract), $208 (noncontract)
Sovrus, Inc. (613) 963-8811	R	NP	Mass.	24 hours/ 7 days	IBM 4300 series, 3080 series, Wang VS85, VS100, VS300, VS65	9	1	2 hours	Replacement parts, 24-hour on call	No	Consulting	Time and materials, basic maintenance	No	No	Annual prepayment	NP
SSCI, Inc. (714) 832-7724	10	33	Nationwide	8-5	Sperry Univac V77	16	2	4 hours	Replacement parts, 24-hour on call, loaner parts	No	Both	Time and materials, basic maintenance	No	Yes	Volume	$100
Sysus, Inc. (703) 378-6300	9	150	U.S. nationwide	8:30-5:30	Wang VS-100, VS-300	21	1	4-8 hours	Replacement parts, 24 hour on call, loaner parts, depot repair	Yes	Training	Time and materials, basic maintenance	No	Yes	None	$70
Summus National Support Group (713) 579-6969	10	300	Nationwide	8-5	DEC PDP; Microvax II, III; VAX-11/700 series	20	1	4 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Training	Customized contracts available	No	Yes	Multiyear, volume	$76
Technaster, Inc. (516) 349-7833	9	4	N.Y. metro area	8-6	DEC PDP 9	5	1	4 hours	Replacement parts, guaranteed uptime, 24-hour on call	No	Neither	Basic maintenance	No	No	None	$75
Telos Field Engineering (801) 298-8000	16	80	U.S. nationwide	7-6	All CDC, DEC, IBM, Data General, HP, Wang	300	70	4 hours	Replacement parts, guaranteed uptime, 24-hour on call	No	Both	Time and materials, basic maintenance	No	Yes	None	$50-$100

19 Reasons Why The Mainframe Users In The



Most Discriminating World Choose Amdahl.

The results of the 1989 Datapro Survey of Mainframe Computer Users are in, and once again, Amdahl has swept the field, earning the highest ratings in 19 of 25 performance categories.

- **Amdahl ranked first in "overall customer satisfaction" for the second year running.**
- **Amdahl ranked first in mainframe reliability, maintenance, service and technical support.**
- **Amdahl was the only company to notch a perfect score—100%—when mainframe users were asked if their system met all of their expectations.**
- **Amdahl was also the only company to score a perfect 100% when users were asked if they'd recommend their system to a fellow user.**

So if you're not running Amdahl mainframes in your data centers, you're running with a runner-up.

Or an also-ran.

With annual sales of more than $2 billion, Amdahl designs, develops and manufactures large-scale, high-performance computer and communications systems and disk storage products for corporations, governments, universities and research foundations throughout the world.

Amdahl Corporation
1250 East Arques Avenue, Sunnyvale, CA 94088-3470

amdahl

The choice of the world's most discriminating mainframe users.

VENDOR	YEARS IN BUSINESS	SITES SERVICED NATIONWIDE	U.S. AREAS FOR ON-SITE SERVICE	SERVICE HOURS[1]	HARDWARE SERVICED	NUMBER OF FIELD ENGINEERS	DISPATCH CENTERS	GUARANTEED RESPONSE TIME	SPECIAL OPTIONS	COMPUTERIZED DISPATCHING	CONSULTING/TRAINING	CONTRACT STYLE[2]	PENALTIES FOR CONTRACT CHANGES	WARRANTY AUTHORIZED	TYPES OF DISCOUNTS AVAILABLE	MINIMUM HOURLY RATES
Texas Instruments, Inc. (800) 847-0797	30	130	Nationwide	8-5	Data General, DEC, IBM, HP, Wang	NP	3	8-8 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Both	Time and materials, basic maintenance	No	Yes	Multiuser, volume	$125
3-D Business Computers, Inc. (714) 751-0140	12	200	Southern Calif.	8-5	All point 4 Data Corp. users	6	1	4-8 hours	Replacement parts, loaner parts	Yes	Both	Time and materials, basic maintenance, immediate replacement	No	Yes	Annual prepayment	$50 depot/$75 on-site
TRW Computer Maintenance, Inc. (513) 459-8887	9	25	Central and Southern Texas	24 hours/ 7 days	IBM 4300, System/34, 36, 38	5	1	2 hours	Replacement parts, 24-hour on call	No	Neither	Time and materials, basic maintenance	No	Yes	2- and 5-year contracts	$70
Total Tec Systems, Inc. (201) 906-8800	10	150	Northeastern U.S.	8-5	DEC Microvax, PDP-11, VAX, Convergent	9	3	4 hours	Replacement parts, guaranteed uptime, loaner parts	Yes	Both	Time and materials basic maintenance	No	Yes	Hospital, university	$120
TRW Customer Service Division (800) 433-1079	13	35	Nationwide	8:30-5	DEC VAX-11/700 series, 3000 series, IBM 4300 and 3090 series	1,000	40	4 hours	Replacement parts, 24-hour on call	Yes	Training (DEC only)	Time and materials, basic maintenance	No	No	Density, volume	$145
Uniserve, Inc. (214) 238-0724	6	400	U.S. nationwide	8-5:30	Texas Instruments 990 systems	15	2	8 hours	Replacement parts, 24-hour on call	Yes	Consulting	Time and materials basic maintenance, customized	No	Yes	NP	$85/ $40 (travel expenses)
Datapo Corp. (800) 423-5488	100	303,481	Nationwide	8-5	Convergent Technology, DEC, Decision Data, IBM, HP	5,000	9	Less than 2 hours (typical)	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Both	Time and materials, basic maintenance, Unisys newly	No	Yes	Volume	$175-$385
United Service Network, Inc. (714) 833-8588	4	2,000	Nationwide	24 hours/ 7 days	NP	600 subcontractors	1	4 hours	NP	Yes	NP	Time and materials, basic maintenance, warranty	No	Yes	NP	$70
Unibrands Corp. (201) 861-1660	15	70	Philadelphia, N.J., N.Y.	8:30-5	DEC PDP-11, Microvax series	3	1	4 hours	Replacement parts	No	Both	Time and materials, basic maintenance	No	No	Volume	$90
U.S. Computer Maintenance, Inc. (816) 783-4144	4	500	Northeast	24 hours/ 7 days	DEC Microvax, PDP-11, VAX	30	3	4 hours	Replacement parts, guaranteed uptime, 24-hour on call, loaner parts	Yes	Consulting	Time and materials, enhanced coverage	No	Yes	Educational, for 2-year contracts	$110
Ulma Computer Maintenance, Inc. (816) 753-2150	10	1	Central N.Y.	8-4:30	Texas Instruments Business System 990	3	1	9 hours	Replacement parts, loaner parts	No	Consulting	Time and materials, basic maintenance	No	No	None	$40
Welling Electronics (402) 343-6564	30	350	150-mile radius of Omaha, Neb.	8-5	DEC, Data General, HP, Quantel	3	1	1 hour	Replacement parts, 24-hour on call	No	Both	Time and materials, basic maintenance	No	Yes	NP	$50

What's really behind your service delivery

BY DAVID GABEL

Many years ago, when the Volkswagen Beetle was still one of the most popular foreign cars on the road, that auto firm ran an advertisement that asked a rivetingly simple question: "Did you ever wonder how the man who runs the snow plow gets to the snow plow?" The answer, of course, was with a VW.

What made that particular question so effective was that it was the kind of thing nobody ever really did ask themselves.

Here's another one: Have you ever wondered what the company that keeps your information systems humming uses to support its own operations?

The answer, according to Henry "Buddy" Stigler, manager of customer service at Input, Inc., a market research firm in Mountain View, Calif., is frequently as much automation as it can afford.

In a field that is growing more competitive and more demanding, Stigler says, service providers are finding that they need more IS support just to stay competitive. "Each year, the users raise the bar in terms of system availability. They are all becoming more dependent on their systems, and the maintenance providers have to use all they have to keep those systems up and running," he says.

Automated dispatch systems, which eliminate the need for a switchboard operator and allow technicians to respond to service calls even when they are out in the field, are a particularly popular support mechanism.

Applied Systems Technologies (AST) in Doylestown, Pa., added such a system, called Radiopage America, to its Dispatch-1 software system. "If a service call comes in, the system can determine which technician should take it and call him via the beeper," says Zack Bergreen, president of AST. "If it can't find a technician, it will escalate the call to a supervisor."

Another way maintenance providers use computers to their advantage is to take the data they collect from their basic transaction systems and reuse it. According to Jeff Miller, a principal at Andersen Consulting in New York, the computer maintenance business is uniquely suited for this. "I've never seen a business that better lends itself to managing by the numbers than high-tech service," he says.

One firm automating the way it gathers such data is IBM. Equipped with a portable cellular telephone, field-service technicians not only communicate with the dispatcher but with the maintenance transaction system.

The technician can transmit information back to a database such as the nature of the problem, the diagnostic routine followed and what parts were installed. Such data is eventually used in management reporting.

Another way to use this information is to store recurrent problems and their solutions in a database. "A problem database is especially useful for software," Stigler says, because common defects tend to arise. Once such defects are logged and their solutions known, they can easily be fixed with a customer over the telephone. "Today, almost all software support is in the customer service center."

Another avenue that is being explored is expert systems. Joseph Trpik, editor of *AFSM International*, the journal for the Association of Field Service Managers, predicts that service vendors, already beginning to be spread too thin across the multitude of value-added services, are going to start looking toward artificial intelligence systems for use in diagnostics and repairs.

Rosch Intelligent Systems in Chestnut Hill, Mass., provides an AI tool called Computer-Aided Intelligent Service (CAIS) for service organizations. It enables service and maintenance firms to develop expert systems for the particular areas that they cover.

Bell Technical Services in Toronto, Canada's largest third-party service provider, is using CAIS to develop an expert trouble-shooting system for peripheral equipment.

In an area as large and sparsely populated as Canada, a technician's territory can spread across many miles. For this reason, he is responsible for providing on-site diagnostic expertise for a great diversity of equipment. If the field technician is given an expert's experience on equipment with which he may be unfamiliar, he is better able to diagnose a problem and order the right spare part the first time. If he gets the symptoms of the problem over the phone, he can even use the expert system to arrive at the client site with parts in hand.

The move into AI is a good sign that service providers are taking the cue from their own industry to gain competitive advantage. Whether behind the scenes or in plain view, IS will play a large role in helping them deliver the most for the maintenance dollar. ●

> "THE MAINTENANCE providers have to use all they have to keep those systems up and running."
>
> HENRY "BUDDY" STIGLER
> INPUT

Gabel is a free-lance writer based in Northport, N.Y.

John Diebold on innovation

Organizations willing to make the time and commitment can reap big rewards from fresh thinking, industry pioneer says

BY JOHN DIEBOLD

Organizations inclined to pay only lip service to innovation — regarding it as a lofty-sounding idea bound to impress the stockholders — must remember its direct relationship with newness and be forewarned that an attempt to gain financial reward through its use is going to be anything but an easy short-term project.

There is no shortage of evidence to support the theory that a genuine dedication to innovation in all areas has become an imperative for the future. The old axiom "Why fix it if it ain't broke?" no longer has much relevance. A better slogan for a rapidly changing era might be "Improve it or they'll remove it!"

In recent years, we have advanced from the vacuum tube to the transistor to the microchip, from typewriter carbon paper to the modern duplication machine, from the early death certificate to organ transplants, miracle drugs and genetically engineered health aids — because forward-looking, determined people were convinced there was a better way. But innovation does not occur in a vacuum.

Great innovations often spring from the focused thinking of an intelligent, imaginative individual — a phenomenon that is as prevalent today as it was in the past. The most noticeable difference between the innovators of the past and those of today is that the latter have much better access to a larger body of knowledge. This, in itself, is an indication of the innovative processes that have hastened the arrival of the communications age and the high-tech revolution. Trial and error is still an integral part of scientific research, but newer approaches have often reduced the discovery time span.

Chester Carlson, inventor of the xerography process, is an innovator who fits the classic mold of the solitary genius who struggles alone. It is no accident that his travail began in the earliest time period and that he was forced to turn to others before his dream began to be fulfilled in 1950. Yet the key to making xerography a commercial success was an organization that allowed extensive innovation in development, manufacturing and marketing of his invention.

Another innovator, Fred Smith of Federal Express, was an entrepreneur rather than an inventor. He also displayed enormous individual zeal in launching the innovation that was the product of his own mind, though he is the first to insist that he didn't do it alone. Far more common in recent years are brilliant individuals such as Walter Brattain, John Bardeen, William Shockley, Theodore Maiman, Alfred Alberts, Jean Borel, Robert Maurer and Charles Ginsburg, whose achievements resulted from work performed in commercial laboratories and research centers.

Significantly, few if any of these industrial innovators had personal financial gain as the primary motivation for their efforts. The quest for knowledge, the desire to improve the lot of humanity and the prestige of historic accomplishment were of primary importance to most of them.

Of course, it must be stressed that few had much choice in the matter. Although permitting the name of the individual scientist to be given on the patent, virtually all major research organizations require employees to sign advance agreements that automatically confer ownership of the patents — and the subsequent financial rewards — to the employer. This has always been a contentious issue between scientist and corporation, and it is no coincidence that many innovators left their parent companies soon after making their discoveries in an attempt to form their own businesses and thus profit from their work.

Some inventors say they want to see the issue of patent ownership decided in the courts, and there is much to support both sides of the argument. It seems self-evident that a person should be entitled to the maximum return for the fruits of his own endeavor.

On the other hand, as the corporations argue, who is to say the individual would have been able to make his breakthrough without the wide range of security offered by the parent company in paid time and scientific and financial support? History must not obscure the roles of the special individuals who proved the rightness of their theories, sometimes with the halfhearted support of management, but there is no doubt that most recent outstanding innovations emerged from collective efforts in programs sponsored by organizations.

This verifies the value of innovative research and is reason enough for business leaders to examine the wide potential of innovation within their own companies.

Cases repeatedly demonstrate that commercially

Diebold is founder and chairman of Diebold Group, Inc., an international management consulting firm.

Every 500 years or so comes

Photo credit: Bettmann Archive

Johannes Gutenberg, 1454.

Introducing the new IBM LaserPrinter: 25% faster printing, advanced features and a revolutionary streamlined design.

A printer that can raise your productivity as much as the new IBM LaserPrinter doesn't come along every day.

Not only does its advanced design make it outperform the HP LaserJet Series II, which up till now has been the benchmark in laser printing. But also, its advanced design gives the IBM LaserPrinter a dramatically new, more space-efficient shape.

Yet with all this, there's one area in which the competition rises above us: their price.

We just advanced the art of laser printing a full 25%. The new IBM LaserPrinter gives you state-of-the-art print quality a full 25% faster than its main competitor.

Why other printers can't follow in our footsteps. The advanced design and engineering of the IBM LaserPrinter give it a footprint that's 33% smaller than its main competitor's. And that 33% gives you more usable workspace.

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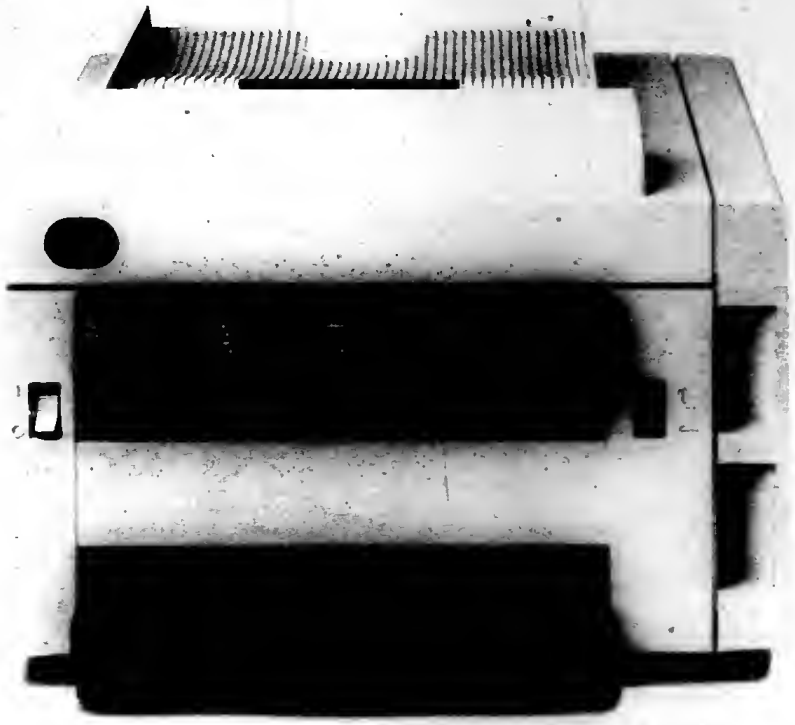

The new IBM LaserPrinter, 1989.

	IBM LaserPrinter	HP LaserJet Series II
Speed	✓ up to 10 ppm	up to 8 ppm
Footprint	✓ 291 sq. in.	432 sq. in.
Paper-handling options	✓ 500 sheets, 75 envelopes	15 envelopes*
Collates letters/envelopes	✓ yes**	no
Plotter emulation	✓ standard	optional
Resident fonts	✓ 10	6
Font card size***	✓ credit card	"8-track" cassette
Standard weight	✓ 33 lbs.	50 lbs.
Parts***	✓ 400	1000
Dots per inch	300 x 300	300 x 300
Printer emulation	✓ IBM, HP compatible	HP compatible
Printer engine	IBM	Canon
List price	✓ $2,595	$2,695

*HP envelope tray replaces standard paper tray **With paper-handling options ***Approximate

It also takes the lead in paper-handling options by offering automatic collating of letterheads, second sheets and envelopes.** Plus more ample storage capacity.

See history in the making by having your IBM Authorized Dealer or IBM marketing representative demonstrate the exceptional new IBM LaserPrinter. Locate your nearest dealer by calling 1 800 IBM-2468, ext. 194.

The new IBM LaserPrinter. Suddenly, nothing else measures up.

IBM

successful innovation must be accepted as a long-term process that requires a variety of total commitments from organizations that hope to capitalize from it. Consider the time spent by numerous researchers at Bell Labs in investigating the photovoltaic effect in silicon until the three inventors (Shockley, Brattain and Bardeen) produced a working transistor. Then add the years that passed before others elsewhere began to find important applications for the device.

Theodore Maiman took approximately two years to develop the first working laser after Charles Townes and Arthur Schawlow had published their breakthrough paper on the subject, but finding commercial uses for that and the many other types of lasers that followed is an ongoing process that seems destined to produce even more important applications in the years ahead.

Innovators at 3M Co. labored for 11 years before they could produce any kind of commercial product out of the mysterious and risky fluorochemistry project the company had started in 1945. As studies of Sandoz and Merck demonstrate, the time needed to discover a miracle drug is often measured in decades, and the firm that pays for the research cannot expect to begin recouping its investment until long after the breakthrough is achieved. In every instance, the potential rewards of innovation must be carefully weighed against the time, expense and possible failure of the entire process.

Innovation as centerpiece

Can innovation succeed only within the framework of a small organization? We feel a number of stories disprove this widely held theory — although we cannot argue with the contention that the innovation process is often easier in a smaller organization. Because it requires deep commitment, cooperation and close control, innovation flourishes best in an environment where it is the centerpiece rather than a sideline. An urgent need to come up with marketable new products forced small companies in California and New York to begin developing audio- and videotape recorders and experimental machines that might produce dry copies of documents.

The case histories of those companies, Ampex and Xerox, demonstrate the ability of innovative planning and action to overcome all obstacles in creating new products capable of transforming small companies into major corporations. Their success inspired the start-up of entire new industries, but both Ampex and Xerox were eventually victimized by a rapid growth syndrome that necessitated a painful reconsideration of goals and methodologies.

Do successful, long-established companies have too much to lose by rocking the boat with risky adventures in innovation? The visible wilting of once-invincible U.S. industrial giants under the pressure of innovative foreign competition — coupled with the accomplishments of Bell Labs, Merck, Corning Glass and others — clearly indicates that that business commandment is no longer carved in stone. Bell Labs, one of the biggest and best research groups in the world, turned out important advances before and after the transistor because of its established program of encouraging innovation.

Merck occupied a similar position among pharmaceutical companies, but it dared to invest both time and money when it brought in Roy Vagelos to institute fresh approaches to new drug discovery. Under Vagelos' direction, new labs were set up, methods devised and researchers brought in that eventually paid strong dividends, elevating Merck to the rank of most-admired corporation in America.

Corning, an old-line American business with a solid history of success in the production of household glass products, also opted to expand its horizons through the innovative skills of its own scientists. Management, in an admittedly cautious original commitment, offered a group of its researchers the challenge of using their knowledge of glassmaking to create something that had eluded telecommunications scientists for decades. That conservative unleashing of its scientific innovators brought such rapid and astonishing results that Corning must be credited with the key breakthroughs that opened up the age of fiber optics, which is still in its infancy.

To find the pluperfect example of how genuine innovation can prosper in a huge company, one needs to look no further than Minnesota's 3M. Here is a one-time mining company that became even bigger and more successful because of its continuing dedication to innovation. Their formal recognition that "people have a basic urge to create" has led 3M's managers to devise strategies that foster internal communication and shared information and provide employees with challenge, responsibility, resources, rewards and sponsorship that keep the innovation process healthy. These strategies have resulted in a wide variety of products that are spun off into new corporate divisions, specifically designed to avoid the pitfalls of bigness.

Because of innovation's obvious relationship to newness, it would seem to follow that companies that expect to profit from its application must be pioneers. Our research demonstrates that this is not always the case. The misconception probably lies in the subtle differences between the words *invention* and *innovation*.

A company that introduces a new invention is not always capable of finding ways to make immediate and marketable use of its potential. Such was the case with Bell Labs and the transistor, as well as Hughes Aircraft and the ruby laser. As others have aptly noted, few in the automobile industry can readily name the man who actually invented the automobile, but most will profess some knowledge of Henry Ford, whose method of mass-producing cars made them available to a large American public. This interplay between invention and a viable product/service is where sensitive and understanding management determines fizzle or success.

And it is the increasing need for world-class corporate scale to permit success in this transition that presents managers of the innovation process with their most crucial challenge.

Pioneers don't always win

An entire series of events illustrate the fact that pioneers don't always win the monetary sweepstakes. European and Japanese concerns first experimented with the development of cash-dispensing machines. But America's Docutel created the magnetic-stripe technology that made it the leading producer of automatic teller machines and cleared the way for ATMs to become the cornerstone of electronic banking.

Other companies then improved on the Docutel machine and achieved even greater success. Chemical Bank pioneered the use of ATMs in the U.S., while rival New York Citibank watched and learned before moving boldly with sweeping strategies that proved just how valuable the machines could be to the public and the banking industry. In each instance, one is forced to wonder which was the innovator — the pioneer or the latecomer?

An even more striking example that victory does not always come to the front-runner is to be found in the history of videotape recording. The engineers at America's Ampex created the technology that cleared the way for the high-quality reproduction of television pictures and sound, and RCA and other U.S. electronics firms added their share of important refinements. But oone of them succeeded in reinforcing technological skills with sound business practices — production and marketing — that would permit them to stay the course. Japanese competitors, in a dazzling display of speed and strategy, refined the original technology and defined and captured a market far bigger and more profitable than that of the pioneers.

These and other examples demonstrate that discovery, as vital as it is, is but one phase of the process of innovation that makes it possible for business to prosper and humanity to profit. None of the new concepts or products would have had an opportunity to benefit the general public except for the strategies that brought these innovations to the marketplace.

Accepting time and risk

Clearly, there can be no single foolproof formula for fresh thought and action that will be applicable to every field of endeavor. But there are recurring themes in case histories of innovation that, put together, form a distinct outline for a workable approach. They are discernible attitudes that have given organizations a distinct competitive edge when consciously nurtured and actively practiced on all levels.

Companies that profit from innovation must, first of all, be aware of the time and risk factors inherent in that commitment and must be prepared to balance the continuing profits from established products against the financial risk of untested new areas. Discovery does not automatically translate into commercial success, and the rewards tend to be commensurate with the level of risk. Virtually every company that has profited from innovation found its own approach only after continual reexamination, debate and testing.

Innovation invariably breeds other innovations, and it is this capacity for proliferation that has led us into this era of rapid change since the end of World War II. It is both encouraging and important to note at this point in our history — when there seems to be such an emphasis on *things* — that the more successful and innovative a firm is, the higher the premium it places on human resources. Genuinely innovative firms recognize the value of human talent and treat it as capital: a theme as old as yesterday's hopes and as new as tomorrow's aspirations, which is as it should be.

Innovators have been active since the first prehistoric man learned to use fire for his tribe's benefit. Their *work* has increased as they participated in the shrinking of the planet and the enhancement of life throughout the world. So it seems only fair to say their *work* will not diminish in importance for as far into the future as the human mind can comprehend. •

Who are the innovators?

John Diebold touts the following as significant achievements made possible by a dedication to the process of innovation:

- **THE TRANSISTOR** William Shockley, Walter M. Brattain, John Bardeen, Bell Laboratories, 1948.
- **T-PA** Tissue plasminogen activator, a genetically engineered drug to dissolve blood clots, Genentech, Inc., 1987.
- **LASER** Theodore Maiman, Hughes Laboratories, 1959.
- **MEVACOR** Anticholesterol drug, P. Roy Vagelos and team, Merck & Co., 1987.
- **AUDIOTAPE, VIDEOTAPE, VIDEOCASSETTE** Ampex Corp., 1947; Charles P. Ginsburg, Charles E. Anderson, Shelby Henderson, Ampex, 1956; 1963.
- **ELECTRONIC BANKING** Jack Chang, Docutel, sponsored by Chemical Bank, 1969.
- **SCOTCHGARD** Fluorochemical fabric protector, Patsy Sherman and research teams, 3M Co., 1956.
- **CYCLOSPORINE** Transplant rejection remedy, Jean F. Borel, Sandoz Ltd., 1972.
- **XEROGRAPHY** Chester F. Carlson, 1937.
- **FIBER OPTICS** Donald B. Keck, Peter C. Schultz, Robert D. Maurer, Corning Glass Works, 1970.
- **OVERNIGHT DELIVERY** Frederick W. Smith, Federal Express Corp., 1973.

COMPUTER INDUSTRY

INDUSTRY INSIGHT

Peter Bartolik

Memory loss, U.S. style

In a globalized computer industry, the demise of U.S. Memories draws few tears. Chalk this one up as a victory — albeit a painful one in some quarters — for the free market system.

Even if the memory chip venture had been able to raise the necessary funding, the requirement that systems companies making the investments also commit to purchase a reported 20% of their dynamic random-access memory requirements from it was a mockery of the laws of supply and demand. To put it quite simply, that ain't the way things are done around here.

In the supposedly more monolithic economic structure of Japan, it might well be possible to nurture such a seedling into an industrial giant. But, hey, this is the good ol' U.S. of A., and if we can't come up with a model that builds on our own traditions and values, then maybe we should be questioning whether it is really worth the effort in the first place.

Now, admittedly, there are plenty of sentimental reasons for decrying the inability of U.S. in-

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High-tech: Still alive and well

U.S. technology sector manages to dodge fourth-quarter earnings bullet

BY NELL MARGOLIS
CW STAFF

The case of Wall Street willies that took the zip out of technology stocks earlier this month appeared to be more panic than prognostication last week as fourth-quarter computer-industry earnings reports allayed fears that a disappointing third quarter would give way to a devastating fourth.

Rather than marking new trends, the winter quarter numbers banked up more evidence of proven wisdom of the past year:

- Don't make promises you can't keep.
- Don't make products that don't work.
- Give the customers what they want, when they want it, then give them more.
- Expand abroad.
- If it isn't working for you, fix it, sell it or cancel it.

Thus, **Intel Corp.** rode a slew of new products, including a microprocessor that catapulted the company into a new position in the supercomputer market, to a 23% revenue rise and a 43% increase in profits. The company credited the contribution of international operations — now responsible for 43% of total revenue — and noted the particular strength of its burgeoning Asia-Pacific sector.

Similarly, **Microsoft Corp.** President Jon Shirley, claiming that strong performances across the board boosted the software player's fourth-quarter revenue 43% to beyond the $300 million mark, noted that "for the first time in the company's history, revenue from worldwide applications products accounted for more than 50% of [its] total business." According to Michelle Kaufman, an analyst at Labe, Simpson & Co., Inc., Microsoft is also benefiting from focus. "The company is just concentrating on what it does best — making microcomputer software," Kaufman said.

Meanwhile, **Software Publishing Corp.**'a chief executive officer publicly credited the firm'a vice-president of international operations and his crew with delivering the above-target foreign sales that were instrumental in bagging healthy double-digit revenue and profit increases for the business productivity software company.

Nothing looked wan about **Network Equipment Technologies, Inc.** in the fourth quarter except its market niche: The wide-area networking products and services provider logged quantum gains both at home and abroad.

1989 fourth-quarter earnings

Actual earnings put early fourth-quarter slump worries to rest

	Revenue (in millions)	Percent change from 1988	Net income (in millions)	Percent change from 1988
NCR	$1.8B	2%	$147	(1%)*
Intel	$895	23%	$123	43%
Borland International	$30.2	26%	$3.2	268%
Advanced Micro Devices	$285.3	15%	$11.8	—
FPS Computing	$58.5	(17%)	($14.9)	—
Automatic Data Processing	$414	1%	$50	14%
Network Equipment Technologies	$52	46%	$5.7	36%
Microcom	$18.5	25%	$3.0	50%
Landmark Graphics	$12.1	19%	$1.3	(7%)
Software Publishing	$30.1	30%	$5.5	45%
Microsoft	$300.4	43%	$74.5	57%
Silicon Graphics	$103	56%	$7.2	177%
Quantum	$111.2	115%	$10.3	212%

* Parentheses indicate a reduction

3Com switch moves it back on right track

ANALYSIS

BY PATRICIA KEEFE
CW STAFF

You could say all it took was a few tough quarters to push Ethernet maven 3Com Corp. into revamping mode. But there'a more to it than that.

The company'a high-speed earnings train was derailed in the last two quarters prior to its second fiscal quarter ended Nov. 30, 1989, when it managed to post more respectable numbers.

But the sudden financial chill can be related back to the requirements of an open systems strategy and seemingly insurmountable competition in several longtime key areas of focus. In addition, some analysts said the company had spread itself too thin.

3Com has moved to address these problems with an executive-level reorganization announced two weeks ago, and by narrowing and shifting its focus to three hot value-added mar-

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Inside

Betting on Small Talk and big plans

BY JEAN S. BOZMAN
CW STAFF

MOUNTAIN VIEW, Calif. — For the past two years, Parc Place Systems, Inc., an offshoot of Xerox Corp., has been preaching the gospel of object-oriented programming to both software vendors and end users. Now, having gathered a core congregation, the Silicon Valley start-up is planning to spread the word — and to double in size by 1991.

Parc Place, which owns the global distribution rights to Xerox's Small Talk programming language, has just 55 employees now. But by 1991, the company intends to have twice that many, said Doug Pollack, the firm's marketing vice-president. The anticipated growth stems from wider acceptance of Small Talk, which has been used to build many Apple Computer, Inc. Macintosh applications.

However, Small Talk code that runs on an Apple Macintosh can also run on a Sun Microsystems, Inc. workstation or an IBM Personal Computer.

"Most of our customers are large, multinational corporations in which the divisions have different hardware platforms," explained Parc Place Chief Executive Officer Adele Goldberg.

"Source code developed with our software can run on all those machines without recompilation," she said, adding that change management in later releases of Small Talk-based applications is also simplified.

John Davis, a partner at Andersen Consulting in New York, says that programmers there have used Small Talk 80 to develop applications software for Andersen clients since 1987.

"Small Talk is a completely open system," Davis said. "If you want to put a video inside a screen window, you can do that, or if you want to hook a user interface to a relational DBMS, you can do that. It's a highly productive working environment."

However, there is a steep learning curve for those new to programming in Small Talk, Davis noted.

"It may take six months or more before someone becomes really effective as a Small Talk designer," he said. But the investment of time pays off when programmers generate code that can be easily ported for Andersen's largest corporate customers, Davis added.

Parc Place diversified its product mix in June, with the addition of a highly portable C compiler called C++. "With the addition of C++, we're starting to look like a more balanced corporation," said Pollack, who joined Parc Place's after eight years of working for Apple and 3Com Corp.

Bankrolled with $5.5 million in venture capital, privately owned Parc Place declined to detail its revenue, other than to say that it is also expected to double next year. While Parc Place revenue dates from the small firm's launch in March 1988, Small Talk's revenue stream traces back to 1986, when the company was still operating as an independent business unit of Xerox.

> "SMALL TALK IS a completely open system. If you want to put a video inside a screen window, you can do that, or if you want to hook a user interface to a relational DBMS, you can do that."
>
> JOHN DAVIS
> ANDERSEN CONSULTING

To build market share, Parc Place has made alliances with several major computer companies, including Hewlett-Packard Co. and Sun Microsystems, and plans to announce more such relationships this year. Xerox also retains a 20% stake in its offspring.

The key to growing the company, Goldberg said, is to get more Parc Place "advocates" within large end-user organizations and large hardware companies. "We use our relationships with hardware vendors to develop support for more platforms," she said. "We use our relationships with major corporations to understand how to expand our source-code libraries for programmers and how to give specialized support."

The near-term goal is to bring the C++ offering, aimed primarily at the Unix market, to the same level of support as the well-defined Small Talk language, Pollack said. To that end, Goldberg hopes to leverage the lessons learned in Small Talk development in order to accelerate the pace of development for the C++ product line.

Like any other aspect of Parc Place's object-oriented technology, promoting C++ use has also become a missionary "sell" to customers.

"We're trying to get people to use C++ when they do incremental testing of their C programs," Goldberg said last week. "We hope that after they get their feet wet, they'll jump in and use C++ to write programs from scratch."

IN BRIEF

A friend in high places

In a reportedly amicable move earlier this month, Tom McAuliffe stepped out of his post as chief executive officer at Boston-based executive information systems vendor Pilot Executive Software. McAuliffe will move to a position on the company's board, according to company sources. David Friend, Pilot's chairman, will expand his role to incorporate the CEO title.

Doogie Howser, IS director

From the folks who brought us Julia Child, "Upstairs Downstairs," and "This Old House," public television is turning its attention to the information age. WGBH, Boston's Public Broadcasting Service outlet, has announced that it is producing, along with the British Broadcasting Corp., a six-part series called "The Information Age." Slated to air in 1991, the series will chronicle the rise of modern computing from the pioneering days of the 1940s to the present.

The Cisco bid

Menlo Park, Calif.-based bridge/router multiprotocol networking systems provider Cisco Systems, Inc. has reportedly filed for an initial public offering of 2,800,000 shares, expected to be priced between $13.50 and $16.50 per share. The California company is being taken public by Morgan Stanley & Co. and Smith Barney, Harris Upham & Co.

Chalk up one more

Unisys Corp. earlier this month melded elements of its commercial and government business groups into the new Systems Management Group. Targeted at both government and commercial markets, the new groups will be headquartered in McClean, Va. and headed by David Gompert, previously Unisys vice-president of corporate development and strategy.

Technology research firm gets CEO

FRAMINGHAM, Mass. — International Data Corp., or IDC, the $50 million information technology market research and consulting arm of publishing entrepreneur Patrick J. McGovern's International Data Group (IDG) conglomerate, has named French veteran executive Axel Leblois as its new chairman and chief executive officer.

Leblois, president of IDG's publishing division from 1986 to 1989, is currently serving as vice-chairman and executive committee member of IDG, which is the parent company of 85 computer industry-related operations worldwide. He is 41 years old.

Key contributor

Lebois will continue in both positions while heading up the front office at Framingham, Mass.-based IDC.

"Axel has been a key contributor to IDG's rapid global growth since 1983, setting up successful new operations both overseas and in the U.S.," said McGovern, the conglomerate's founder and chairman.

"As a key strategist at IDG, [he] will be able to bring together the synergies between IDC's research capabilities and IDG's other worldwide activities," McGovern added.

Microsoft's network unit: Moving forward to the past

BY CHARLES VON SIMSON
CW STAFF

REDMOND, Wash. — In an effort to consolidate management of related marketing and development efforts, Microsoft Corp. has quietly reorganized its two network systems units into a single organization. The enlarged networking business unit will be led by Mike Murray, who previously headed one of the two divisions.

Microsoft's Murray will head new unit

"The move basically returns the networking business unit to the structure it had a year ago," Murray said.

"People's jobs have not really changed. This is just an organization that makes more sense," he added.

The new group, officially formed on Dec. 22, will have responsibility for the development and marketing of the Microsoft LAN Manager network operating system and the company's SQL Server and Com Server applications.

The company's work group services unit, which was previously responsible for development of SQL Server and Com Server, will be dissolved.

Former work group services general manager Adrian King will become assistant general manager under Murray. Also reporting directly to Murray will be engineering manager for the network business unit Brian Valentine and group product marketing manager Bruce Jacobson.

In addition, the new plan calls for several members of Valentine and Jacobson's staffs to report to Murray.

Streamlining

Murray will be the sole direct report from the network business unit to Microsoft's director of systems software Steve Ballmer.

Under the old organizational structure, Murray, King and former director of development Darryl Rubin reported to Ballmer. With the shift in the unit, Rubin has moved into the company's applications business.

"With Ballmer's position in the company, having him act as the group's general manager with three reports didn't make any sense," Murray said.

3Com

CONTINUED FROM PAGE 109

kets: network management, connectivity services and applications.

The company has traditionally pushed system sales comprising its network operating systems running on top of its hardware, even though one of the more prevalent network designs consists of Novell, Inc.'s network software running on top of 3Com adapters. Forrester Research, Inc. in Cambridge, Mass., estimated that Novell holds 65% of the Fortune 1,000 personal computer local-area network market. 3Com also got squeezed between a price war in Ethernet adapters and IBM's dominance of the Token-Ring market.

3Com's Benhamou

Two years ago, 3Com bought a wide-area networking company, precipitating a push to position itself as an enterprisewide system supplier. It then bet its network software, which encountered some problems of its own in the initial release, on the so-far dimly lit star of LAN Manager.

The boom was lowered in the summer and fall of 1989, as 3Com's earnings failed to meet Wall Street's expectations.

The recent shuffling of executive posts, which resulted in three rather than 11 vice-presidents reporting to Chairman William Krause, is seen by some financial analysts as the 3Com board's way of punishing Krause for his admission that he "took [his] eye off the ball."

To get the company back on a profitable track, 3Com is retrenching. It has chartered a new four-member executive committee, composed of Krause and three newly appointed executive vice-presidents — Eric Benhamou, Leslie Denend and Robert Finocchio Jr. — to handle the day-to-day operations of the firm.

The company has also backed away from two areas clearly dominated by competitors: MS-DOS-based LAN operating systems and Token-Ring hardware. For example, the new 3Com plans to enable 3+Open clients to access Netware servers and is working to allow Netware to run on 3Com's 3S500 server.

"To successfully sell into the installed base, we have to offer ways to sell into the Netware environment," Benhamou said.

The company has also shelved its bid to challenge IBM in the Token-Ring arena. If it does offer users a 16M bit/sec. card, it will be an OEM product.

3Com also intends to remove itself from an anticipated crush of LAN Manager server offerings once a standard has been established. Of course, 3Com will continue to offer its LAN Manager-based 3+Open server software. However, what the LAN market really needs right now, analysts said, is applications.

"If 3Com moves to provide application sets transparent to the operating system environment, they'll do themselves an incredible service," said Doug Gold, an analyst at International Data Corp. in Framingham, Mass.

"Our focus must shift to what users really want next," Benhamou added. Few, he said, are building networks from scratch; what they need are interconnectivity products.

Hence, 3Com's new emphasis on its value-added services. The company will unbundle its value-added services, such as its mail, Systems Network Architecture and Transmission Control Protocol/Internet Protocol gateways, Gold said.

Bartolik

CONTINUED FROM PAGE 109

dustry to retain a leading role in the DRAM market; it was, after all, a creature spawned and nurtured in the wilds of the American entrepreneurial frontier.

However, sentiment is hardly a justifiable reason for investing in a seemingly ill-conceived structure that neglects all the basic tenets of U.S. business competition.

The requirement — even if not cast in stone — that the investor systems companies commit to purchase a fixed amount of product from U.S. Memories was a pretty sorry excuse for a business plan. It amounted to an outright, before-the-fact admission that the would-be silicon foundry would not be able to compete without a de facto subsidy.

Lacking such confidence, investors would be pretty darn silly to not only tie up a significant chunk of capital but also to lock themselves into buying a fixed amount of product that ultimately could prove to be more expensive than other alternatives and inferior in quality. There are only two ways to sell in this day and age: Either make it better or make it cheaper.

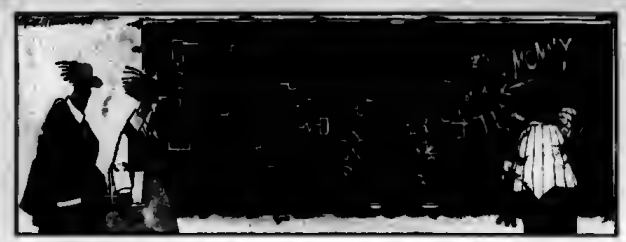
There is a revisionist tendency in the U.S. to blame the demise of the U.S. memory chip industry solely on the anti-competitive elements of the Japanese industrial powers and the closely tied industrial policy of the Japanese government. Certainly, those elements have allowed the Japanese to capitalize on the weaknesses of U.S. manufacturers, but what first enabled them to get their foot in the door was proof that they could provide better quality at a lower price than the competition.

When U.S. chip suppliers and customers were content to overlook faulty products, the Japanese suppliers and customers were building an intolerance to shoddiness and taking aim at the concept of zero-defect shipments. The Japanese got ever better and, one by one, U.S. memory chip makers pulled themselves off the field, figuring they could better compete in the areas of microprocessors and other specialized chips.

Well, there are plenty of other developing nations trying their hardest to emulate the Japanese model, so why not let them go at it?

If we cannot compete at the commodity level, and there is ample evidence that indeed we cannot, there are plenty of others more than willing to make the effort. And if that bastion of the U.S. computer industry — IBM — is so concerned about spawning a viable domestic memory chip manufacturer, here's one suggestion: Spin off its own chip operations into an independent entity and let it raise money on a business plan that reflects the tried and true American manner.

Bartolik is *Computerworld's* news editor.



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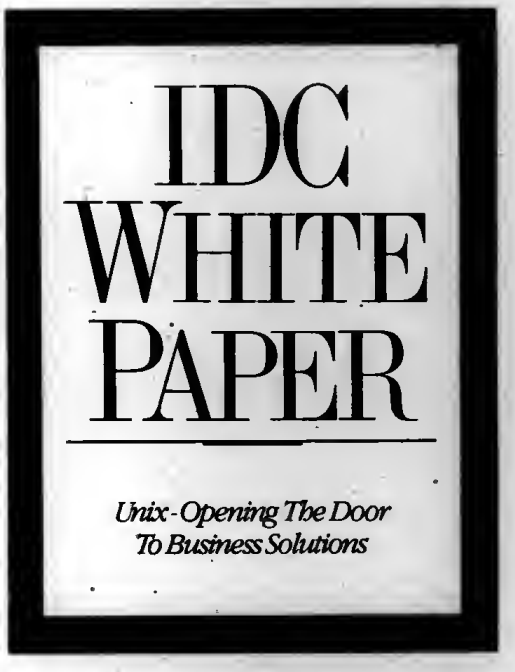

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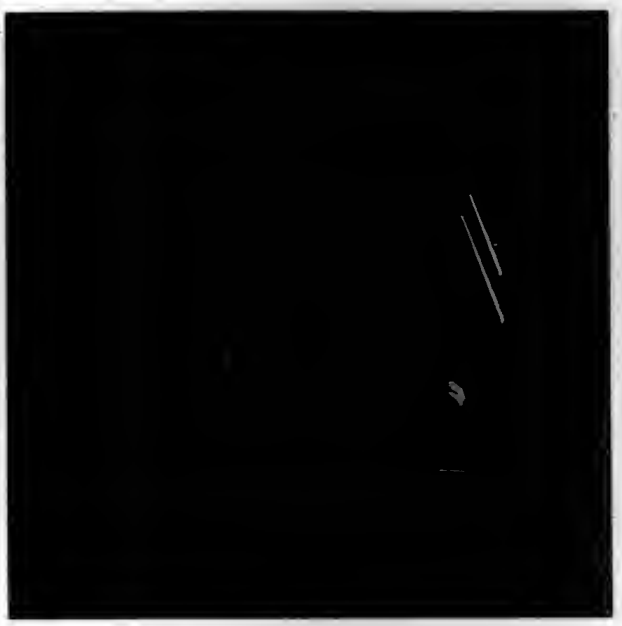

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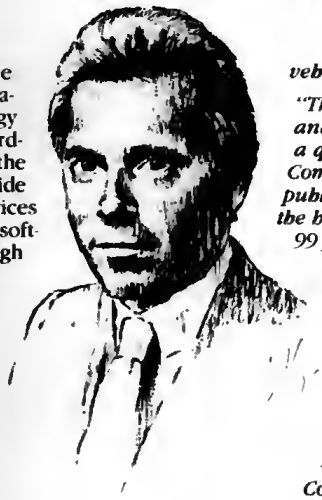

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Scrambling on the sidelines

At pro football teams, computer managers assume a defensive stance

BY DAVID A. LUDLUM
CW STAFF

They are not exactly the starting quarterbacks: They don't cut $10 million deals for their services or do beer commercials. But, like the players, computer managers for the teams of the National Football League are a pretty rare breed.

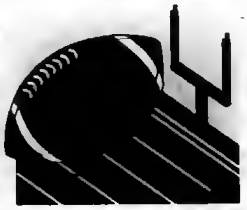
Many of the teams rely on a one-man shop for their in-house computer services. Some have no full-time computer professional, and instead rely on consultants. One such team is the Dallas Cowboys, which helped pioneer computing in football. Last fall, a new cost-cutting management converted the team's computer manager to consultant status.

With 40 end users, the Cleveland Browns run one of the larger NFL computing operations. The Browns employ two computer professionals — George Hoffman, the director, who serves as manager and analyst, and an assistant who programs and handles operations.

Computing at NFL teams has grown significantly since 1985 when the league struck a deal with Digital Equipment Corp.

"Computer knowledge in the NFL was kind of overrated," Hoffman says. "Everyone thought the NFL was high-tech. It wasn't really the case."

The DEC deal, which standardized equipment, brought a Microvax II to most teams, letting them communicate with one another and the NFL office, which had two VAX-11/780s. The Microvax was the first in-house computer for some teams. The Browns and the Buffalo Bills opted for a larger 11/780; the



MARY KEAN

Minnesota Vikings already had one.

NFL computing got under way in the early 1960s when the Cowboys automated record-keeping for recruitment of college players. The next application was the statistical number-crunching used to review a team's performance and analyze competitors. These applications got a boost when packaged versions came on the market. Later that more conventional activities took hold. For instance, the DEC deal allowed teams to exchange electronic mail, update and quickly issue statistical reports and, in some cases, get started with office automation.

Now, teams have automated other applications characteristic of big-time sports. They include issuing and printing of tickets, tracking of season-ticket holders, management of player contracts and keeping abreast of players' nutrition, conditioning and medical treatment.

Hoffman is one of many in-house computer managers in the NFL who moved to the position after serving as a consultant. "I became aware that they needed to pull some things in-house, and I kept campaigning for that," he says. "Then they essentially bought me out."

A more unusual route was followed by Mike Eayrs, who handles computing for the Minnesota Vikings as the team's director of research and development. He played football in college, then taught and coached at high schools and colleges before the Vikings tapped him.

Eayrs is a self-taught programmer, systems analyst and computer manager. He used computers as a student for statistical analysis. As a coach, he suggested using one to recruit players, and someone suggested that he learn how to program. Currently, Eayrs codes in Cobol and fourth-generation languages. He didn't know much about hardware when he joined the Vikings but luckily found that his predecessors had set a reliable architecture.

For Eayrs, the most important ingredients for an NFL computer manager are knowledge of the game and of statistical research methods. "Your credibility goes way down if you start passing around invalid information," he says.

It is also necessary to know how to program and run systems, but those skills are secondary, he says. "I don't get as excited about computers as I do about the information a computer can generate for our organization," Eayrs says.

As recent developments in Dallas indicate, in-house computing by NFL teams may actually decline because of the tough business environment most teams face. Revenue from network television, the chief source of income, has been flat for three years. Meanwhile, players' salaries continue to grow. The situation can make management less receptive to computer initiatives unless the projects promise a competitive edge. "You have to realize there are certain limitations unless you could guarantee something would get them to the Super Bowl," Eayrs says.

However, as elsewhere in business, teams may counter a profit squeeze with a greater reliance on computers. "I don't see any downturn. They're so important to the day-to-day activities," says Michael Megna, a vice-president at American Appraisal Associates in Milwaukee and a specialist in the valuation of sports franchises. Like airlines, teams are using yield management algorithms to establish the best mix of seat prices, Megna says.

There is another trend typical of business that may encourage more in-house computing: the growing sophistication of end users. Following in the footsteps of coaches, the Browns' All-Pro defensive back Frank Minnifield uses a portable personal computer to analyze the moves of the wide receivers he covers.

> "COMPUTER KNOWLEDGE in the NFL was kind of overrated. Everyone thought the NFL was high-tech. It wasn't really the case."
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City of Gainesville
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The City operates an IBM 4381 computer running DOS/VSE and a DEC/VAX computer system.

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The salary range is $39,360 to $57,535 annually plus 6% contribution to deferred compensation.

Application and resume must include social security number. Application deadline Friday, February 23, 1990. Where to apply:

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306 N.E. 6th Avenue
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How to lean on your vendor

You can get support out of your suppliers but be sure to get it in writing

BY MICHAEL ERBSCHLOE
SPECIAL TO CW

If you're thinking about acquiring a new computer system, you better think about what support the vendor will provide, especially if the system will be different from the one you operate now. You can avoid considerable expenses by assuring that the computer vendor provides support in such areas as the installation of hardware and conversion of software, as well as training staff members and end users.

The only reliable way to get assurance of this support is in writing, either in a contract or through written warranties. It is also important to check on the quality of a vendor's service through references. References provided by the vendor can be a start, but you may find them biased. You should be able to find others through user groups and professional associations. Solicit the views of people in as many different positions as possible: Information systems directors, operations managers, operators, programmers and end users involved with all the functions that your system will support.

One additional note: A new salesperson may not be your best friend. Recently, computer companies have been moving administrative workers onto the sales force as they try to cut costs or increase revenue. These transplants usually have minimal experience with a particular product line, receive little training and may not be interested in sales.

We now may be dealing with the least experienced and motivated sales force in the history of the industry.

What do you think this development does for you? It does absolutely nothing. If you are not careful, it may even cost you some money.

With that in mind, the specific issues to weigh in sizing up support include the following:

- **Facilities.** You need to be certain that your vendor fully outlines the physical requirements for your new system. If necessary, arrange for the vendor to send an engineer to your facility to check power, air-conditioning and emergency systems. If the facility will not readily accommodate the new system, you could face last-minute costs.
- **Installation.** You need to determine exactly what the vendor will provide with regard to installation and what costs, if any, you will face as a result. Your purchase contract should contain in detail the steps for which your vendor will be responsible and those for which you will be.
- **Conversion.** If your new system will require conversion of databases or programs, find out what kind of support you will get from your vendor; conversion costs can be very high. You need to explore the vendor's track record to determine its abilities and responsiveness. You can keep up with this sort of information through the trade press and personal contacts with users who have gone through the same conversion.

WE NOW MAY BE DEALING with the least experienced and motivated sales force in the history of the industry.

- **Retraining for IS staff.** If members of your IS staff need to learn about new operating systems or application packages, there are a lot of details to cover. What portion of the training will your vendor provide? Where is the training available? Are there any charges for it? How many people can you afford to send to training sessions?
- **Retraining for end users.** The issues regarding retraining end users are similar to those for retraining the IS staff, except that there is a larger number of people involved. End users will probably outnumber the IS staff by more than a 10:1 ratio; the logistics of retraining 20 staff members pale in comparison with the requirements for instructing 200 end users. Will the vendor be able to supply such training? Does the vendor have a hot line for end users' questions? If so, will such a service add substantially to your costs?
- **System documentation and manuals.** The major issues pertaining to technical documents are quality and quantity. What kind of documentation and manuals will the vendor supply? Will they be adequate in scope? Will you get enough copies for your entire organization or will you have to buy more? Are the manuals written for users at the appropriate levels of proficiency? Will the vendor update the documents? Is there a charge for such updates?
- **Hardware and software maintenance.** As with any purchase, you need to know what your warranties cover, how long they will be in effect and what your maintenance costs will be when they expire.
- **Connectivity.** We are coming close to the day when one computer can be connected to all others. However, we are not there yet. You therefore need to be very careful when it comes to connectivity. Although networking systems can be a very effective means of computing, it can also be incredibly expensive. Before you buy a system, you need to determine what your networking strategy is and what systems can be connected readily to your network. The most likely answer from vendors will be, "Sure, ours can connect." Be sure to explore any associated problems and costs.

Erbschloe is executive editor at Computer Economics, Inc. in Carlsbad, Calif.

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The BoCoEx index on used computers

Closing prices report for the week ending January 12, 1990

	Closing price	Recent high	Recent low
IBM PC Model 176	$550	$825	$400
XT Model 086	$800	800	$700
XT Model 089	775	975	775
AT Model 099	$1,450	$1,600	$1,300
AT Model 239	$1,825	$1,850	$1,700
AT Model 339	$1,825	$1,850	$1,700
PS/2 Model 50	$1,800	$1,900	$1,500
PS/2 Model 60	$2,700	$2,825	$2,500
Compaq Portable I	$645	$750	$550
Portable II	$1,700	$1,725	$1,550
Portable III	$2,400	$2,800	$2,000
Portable 286	$1,900	$2,000	$1,600
Plus	$750	$950	$675
Deskpro 286	$1,675	$1,975	$1,600
Deskpro 386	$3,300	$3,510	$2,750
Apple Macintosh 512	$555	$800	$550
512E	$625	$890	$625
Plus	$900	$950	$900
II	$3,750	$4,200	$2,150

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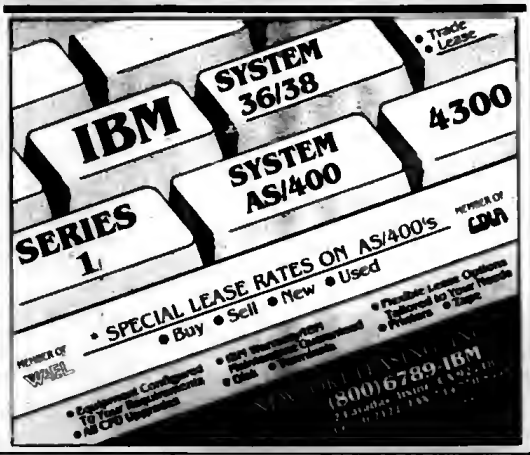

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Request for Proposal No. 1688, due Tuesday, February 6, 1990 at 3:30 p.m. for the acquisition of a local area network link MISSISSIPPI DELTA COMMUNITY COLLEGE.

Request for Proposal No. 1710, due Tuesday, February 20, 1990 at 3:30 p.m. for the acquisition of sixty-six (66) microcomputer systems and peripherals for the DEPARTMENT OF HUMAN SERVICES.

Request for Proposal No. 1711, due Thursday, February 1, 1990 at 3:30 p.m. for the acquisition of local area network with 1 80386-based file server and 8 80286-based workstations for the UNIVERSITY OF MISSISSIPPI MEDICAL CENTER.

Request for Proposal No. 1713, due Thursday, February 8, 1990 at 3:30 p.m. for the acquisition of upgrades to existing NCR Tower Systems in the Home Health and Third Party Billing Divisions of the MISSISSIPPI DEPARTMENT OF HEALTH.

Request for Proposal No. 1714, due Tuesday, February 13, 1990 at 3:30 p.m. for the acquisition of a microcomputer-based governmental fund accounting system to interface with an existing statewide fund accounting system.

Request for Proposal No. 1715, due Thursday, February 15, 1990 at 3:30 p.m. for the acquisition of 10 MS-DOS based CAD systems with related peripherals and software for the Drafting and Design Program at COAHOMA COMMUNITY COLLEGE.

Request for Proposal No. 1716, due Friday, February 2, 1990 at 3:30 p.m. for the acquisition of twenty (twenty) terminals and one asynchronous controller as an existing Data General MV/15000 minicomputer for the MISSISSIPPI STATE ATTORNEY GENERAL.

Request for Proposal No. 1718, due Friday, February 2, 1990 at 3:30 p.m. for the acquisition of a 20 station Local Area Network to accommodate the Reading, Writing, and Mathematics Basic Learning System for COAHOMA COMMUNITY COLLEGE.

Request for Proposal No. 1719, due Friday, February 9, 1990 at 3:30 p.m. for the acquisition of twenty-two (22) UNIX-based workstations to attach to an existing campus network at MISSISSIPPI STATE UNIVERSITY.

Request for Proposal No. 1720, due Friday, February 9, 1990 at 3:30 p.m. for the lease of two optical mark reading systems for the UNIVERSITY OF MISSISSIPPI.

Request for Proposal No. 1721, due Tuesday, February 20, 1990 at 3:30 p.m. for the acquisition of a Interactive Voice Response System for the UNIVERSITY OF MISSISSIPPI.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities.

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The Clerk of the Circuit Court of Hillsborough County, Florida, acting in his capacity as Clerk to the Board of County Commissioners, solicits proposals for the purpose of selecting a vendor to provide software for the Board of County Commissioners of Hillsborough County, Florida, for a financial accounting management system.

Request for Proposal documents may be obtained by calling (813) 272-5192 between the hours of 8:00 A.M. and 5:00 P.M., Monday through Friday.

There will be a Proposer's Conference on February 8, 1990 at 9:00 A.M. at 504 East Tyler Street, Tampa, Florida 33602. All interested vendors are encouraged to send a representative.

A sealed proposal must be received by the Clerk no later than 10:00 A.M. on March 8, 1990. All proposals received by 10:00 A.M. will be opened at that time. There will be no exceptions to this deadline.

Dated at Tampa, Florida, this 17th day of January, 1990.
Richard Ake
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The Computer and Data Communications Services Agency, of N.Y. is soliciting proposals for the upgrade of four IBM 3480 Control Units. To obtain a copy of the request for proposal, please call Jeff Burns at 212-240-4318. Proposals are due by February 14, 1990.

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Training center do's and don'ts

It can provide the ideal learning environment, if given enough thought

BY WILLIAM SEBRELL
SPECIAL TO CW

All of us have attended a variety of professional education sessions. Some of them were held in hotels, others in conference rooms and a few in corporate training centers of one kind or another. The bulk of these sites have been terrible from the standpoint of conducting technical training.

Hotel rooms are probably the worst places for training. Their shape is usually long and thin, which is acoustically terrible. The lighting is often like a cocktail lounge, and while the seating is flexible, it is usually uncomfortable and awkward for a full day's use.

Conference rooms are next in line for the award for worst training site. They too are usually long, thin rooms and contain a single table for all the participants. The ceilings are usually low, so when an overhead projector is used, no one can see. Such a room is often uncomfortably warm.

Some corporate training centers provide outstanding learning environments. Others are not much better than the hotel rooms. Putting aside the issues of office space and facilities for lodging and eating, there are numerous considerations to weigh in designing an effective center. Organizations choosing a training center may want to look for these features too.

For starters, a center should include a reception area that is large enough to handle coffee breaks. The area should include a message center, several telephones for students to use and copying equipment. The restrooms need to be large enough to handle the surge of people at breaks.

The training center should include a kitchen with coffee-making equipment, an ice maker and refrigeration for a lot of soda. A storage area should include lockable cabinets for manuals and software and accommodate the inventory of handouts as well as spare equipment. There should also be an area for hardware maintenance.

Classrooms for lectures and computer training share many requirements, although each activity also creates demands of its own. In either case, classrooms should be roughly square and large enough for 20 students along with center and side aisles and room for an instructor to walk behind students.

The ceilings should be high so students can see screens. There is no need for windows to the outside, which require expensive drapes to cut out light. There should be two entrances, preferably one at the front and one at the back, each with a small window so people can see if the room is in use.

The classrooms should have independently controlled lights in the front, center and rear. Heating and cooling should be controllable in each room. There should be a good exhaust system if smoking is to be allowed, plenty of power outlets, especially in the front and back, and a telephone with a ringer that can be turned off.

The texture of classroom walls should make it easy to pin up items without causing damage. The chairs in the rooms should be comfortable, with the ability to roll, swivel and rock. A clock should be visible to everyone in the room.

Use chalkboards. Whiteboards are difficult to erase, create a blinding reflection when an overhead projector is used and require expensive markers. The chemicals in some of the markers can make an instructor woozy after a full day.

A projection screen should be mounted high in a corner of the classroom where everyone can see it, and it should not block the chalkboard. There should also be some form of color video projection.

In technical training rooms, workstations ideally should be mounted under special desks with glass tops. This way, monitors do not block the students' view of the front of the room, and the room can be used for lectures. If this arrangement is not possible, the students should face the outer walls so the instructor can see what each one is doing from the center of the room.

The plan should call for one student per workstation, with room for two people when the need arises. Raised flooring and creative cabling that provides the flexibility to change equipment should also be considered. Carpet tiles on such flooring can add to the appearance while improving acoustics.

Lecture rooms should provide students with easily movable tables for the students that can be arranged in any way that suits a class. The tables should have folding legs so they can be removed completely for theater-style seating. The plan should be for two students to a table. Ideally, there should be readily accessible conference rooms holding four or five people for discussion sessions.

The difficulty with designing technical training centers is they require considerable flexibility and more thought than has been given to them in the past. Before designing one, it is a good idea to visit several of them to see what works and does not work given different requirements.

Sebrell is a vice-president at Data Base Management, Inc., a subsidiary of American Management Systems, Inc. in Manchester, Conn.

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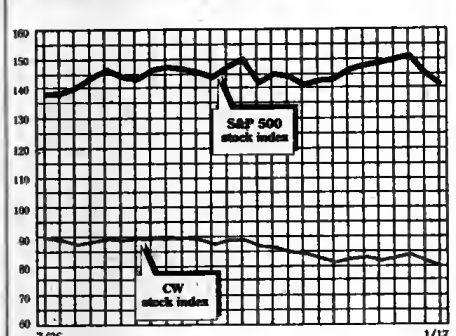
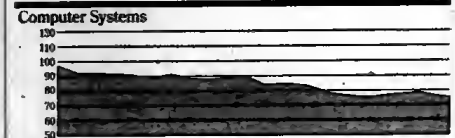
STOCK TRADING INDEX



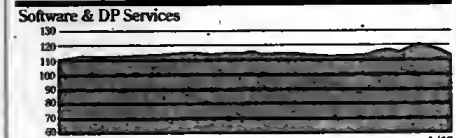
Indexes	Last Week	This Week
Communications	126.4	121.9
Computer Systems	76.9	76.1
Software & DP Services	117.6	113.6
Semiconductors	51.4	50.9
Peripherals & Subsystems	71.8	73.0
Leasing Companies	91.3	87.8
Composite Index	82.2	80.7
S&P 500 Index	146.5	142.3

Communications

Computer Systems

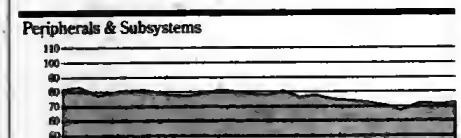


Software & DP Services

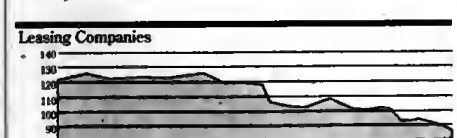


Semiconductors

Peripherals & Subsystems



Leasing Companies



Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JAN. 17, 1990

EXCH

		52-WEEK RANGE	CLOSE JAN. 17 1990	WEEK NET CHANGE	WEEK PCT CHANGE
Communications and Network Services					
N	AMERICAN INFO TECHS CORP	26 47	40.5	-1.5	-2.8
Q	ANDREW CORP	26 46	22.75	-3.5	-9.9
Q	ARTEL COMM CORP	9 3	6.125	-0.3	-5.0
N	AT&T	47 26	42.5	-3.5	-8.5
Q	AVANTEX INC	7 3	3.375	-0.8	-8.8
N	AYDIN CORP	21 14	16.125	-0.1	-0.8
N	BELL ATLANTIC CORP	114 70	98	-4.0	-3.9
N	BELLSOUTH CORP	59 40	52	-2.0	-3.7
Q	COMPRESSION LABS INC	13 3	11.125	-0.8	-6.3
Q	CONTEL CORP	37 21	28.875	-2.5	-8.0
Q	DATA SWITCH CORP	6 2	3.25	-0.1	-3.7
Q	DIGITAL COMM ASSOC	26 17	31.25	-1.1	-5.0
Q	DYNATECH CORP	31 19	16.75	0.0	0.0
Q	FIBRONICS INTNL INC	7 4	6	-0.3	-4.0
Q	GANDALF TECHNOLOGIES	7 4	4.25	-0.5	-8.1
N	GENERAL DATACOMM INDS	7 4	4.875	0.1	2.9
N	GTE CORP	72 44	62.5	-5.5	-8.8
Q	INFOTRON SYS CORP	13 9	7.75	-0.3	-3.1
Q	ITT CORP	65 51	59.125	1.4	2.4
N	M A COM INC	6 4	4.625	-0.1	-2.5
Q	MCI COMMUNICATIONS CORP	49 22	26.125	-0.4	-0.9
N	NETWORK EQUIP TECH INC	25 18	20.375	-1.1	-5.1
Q	NETWORK SYS CORP	10 7	9	0.5	2.9
N	NORTHERN TELECOM LTD	24 14	23.75	0.0	0.0
Q	NOVELL INC	28 24	30.125	-0.3	-3.5
N	NYNEX CORP	92 67	84	-3.0	-3.4
N	PACIFIC TELESIS GROUP	52 31	47	-0.4	-0.8
A	PENRIL CORP	8 4	6.625	-0.3	-3.6
N	SCIENTIFIC ATLANTA INC	25 13	31.5	-1.5	-6.5
N	SOUTHWESTERN BELL CORP	55 41	54.75	-2.5	-4.4
N	3 COM CORP	28 10	12.125	-0.5	-6.7
N	U S WEST INC	81 57	72	-2.5	-3.5
Computer Systems					
Q	ALLIANT COMPUTER SYS	7 3	6.75	0.0	0.0
Q	ALPHA MICROSYSTEMS	8 4	4.25	0.0	0.0
Q	ALTOS COMPUTER SYS	9 6	6.75	-0.3	-6.8
A	AMDAHL CORP	25 11	16	0.4	2.6
Q	APPLE COMPUTER INC	60 33	33.25	-2.5	-7.0
Q	BOLT BERANEK & NEWMAN	11 8	7.125	0.3	3.6
N	COMPAQ COMPUTER CORP	113 51	62.625	-1.9	-1.9
N	COMMODORE INTNL	20 7	6.75	0.1	1.4
Q	COMPUTER AUTOMATION INC	9 3	3.125	-0.1	-3.8
N	CONTROL DATA CORP	24 19	17.5	-0.3	-1.4
N	CRAY RESH INC	38 31	36.125	1.9	9.0
Q	DAISY SYS CORP	7 0	0.75	0.1	9.0
N	DATA GEN CORP	20 11	11.125	-0.4	-3.3
N	DATAPOINT CORP	9 3	4.125	0.8	13.8
Q	DELL COMPUTER CORP	10 5	5.25	-0.1	-2.3
N	DIGITAL EQUIP CORP	125 80	87.875	0.4	0.4
N	FLOATING POINT SYS INC	4 1	1.625	0.1	8.3
N	HARRIS CORP	40 27	32.625	-1.1	-3.3
N	HEWLETT PACKARD CO	62 60	46.75	-1.8	-3.7
N	HONEYWELL INC	92 60	84.75	-1.1	-1.3
N	IBM	131 102	98.875	-0.1	-0.1
Q	INFORMATION INTL INC	16 13	13.125	0.4	2.9
Q	IPL SYS INC	9 9	9.625	0.0	0.0
N	MAI BASIC FOUR INC	11 3	2.25	-0.8	-21.7
N	MATSUSHITA ELEC INDL LTD	192 154	158	-7.0	-4.3
Q	MENTOR GRAPHICS CORP	22 13	16.125	1.1	8.6
N	NBI INC	3 0	0.375	0.0	-7.9
N	NCR CORP	97 53	63.25	0.4	0.8
N	PRIME COMPUTER INC	31 9	9.125	-1.1	-15.5
Q	PYRAMID TECHNOLOGY	25 9	20.875	-0.4	-1.8
Q	SEQUENT COMP SYS INC	23 6	21.375	0.6	3.0
Q	SHAREBASE CORP	4 0	0.25	-0.1	-20.1
Q	SILICON GRAPHICS CORP	29 14	28.25	1.8	6.8
Q	SUN MICROSYSTEM INC	25 13	16.5	0.1	0.8
Q	SYMBOLICS INC	3 1	1	0.1	6.5
N	TANDEM COMPUTERS INC	28 19	25.25	0.1	0.8
N	TANDY CORP	49 37	38.75	-1.8	-3.3
N	ULTIMATE CORP	13 7	9	-0.4	-4.9
N	UNISYS CORP	31 12	16.5	-0.4	-2.9
A	WANG LABS INC	11 4	6.5	0.0	0.0
Software & DP Services					
Q	AMERICAN MGMT SYS INC	19 11	11.5	-0.8	-6.1
Q	AMERICAN SOFTWARE INC	23 11	21	-1.3	-5.6
N	AMACOMP INC	6 4	4	-0.3	-5.9
Q	ANALYSTS INTL CORP	20 11	19	-0.5	-3.0
Q	ASHTON TATE	24 9	11.375	0.3	2.2
Q	ASK COMPUTER SYS INC	19 7	6	0.0	0.0
N	AUTO DATA PROCESSING	51 28	48	0.3	0.6
Q	AUTODESK INC	64 27	38.25	-1.5	-3.8
Q	BMC SOFTWARE INC	33 14	29.5	-1.0	-3.3
N	BUSINESSLAND INC	15 7	8.75	-1.0	-12.9
Q	COGNOS INC	9 4	4.438	-0.3	-4.0
N	COMPUTER ASSOC INTL INC	22 11	12.375	0.4	3.1
Q	COMPUTER HORIZONS CORP	11 7	8.5	-0.1	-1.4
N	COMPUTER SCIENCES CORP	59 46	54.25	-2.5	-8.1
N	COMPUTER TASK GROUP INC	16 9	9.25	-0.1	-1.3
Q	COMPUWARE INC	42 21	35.125	-1.4	-3.8
Q	CORPORATE SOFTWARE	19 9	8.5	-0.3	-3.4
N	GENERAL MTRS (CLS E)	38 43	92.875	-0.3	-0.6
Q	HOGAN SYS INC	7 4	4.25	0.1	3.0
Q	LOTUS DEVELOPMENT CORP	16 8	14.5	-0.3	-1.7
Q	INTELLICORP INC	9 3	4.375	-0.4	-7.9
Q	LEGENT CORP	32 21	28.75	-1.3	-4.5
Q	LOTUS DEV CORP	34 19	28	-0.5	-1.8
Q	MICROSOFT CORP	82 46	87.5	-0.5	-0.6
Q	NATIONAL DATA CORP	36 25	31	-2.0	-6.1
N	ON LINE SOFTWARE INTL INC	11 8	10.625	0.3	2.4
Q	ORACLE SYS CORP	28 10	20.25	0.8	3.8
N	PANSOPHIC SYS INC	19 12	16.125	-0.8	-3.7
Q	PHOENIX TECHNOLOGIES INC	19 3	3.625	-0.4	-9.4
Q	POLICY MGMT SYS CORP	38 25	33	-1.0	-2.9
Q	PROGRAMMING & SYS INC	25 16	21.75	-0.3	-1.1
Q	RELATIONAL TECH INC	19 6	7.3	-0.8	-4.8
N	REYNOLDS & REYNOLDS CO	34 27	20.875	-1.4	-6.2
Q	SAGE SOFTWARE INC	11 7	8.125	-0.3	-3.6
Q	SEI CORP	20 18	18.25	-0.5	-2.7
Q	SHARED MED SYS CORP	19 12	14	0.9	6.7
Q	SOFTWARE PUBG CORP	31 10	10.5	-0.3	-1.9
A	STERLING SOFTWARE INC	9 6	8.125	-0.3	-3.7
Q	SUNGARD DATA SYS INC	26 13	22.5	-2.1	-8.6
Q	SYSTEMATICS INC	60 20	34.5	-1.9	-4.8
N	SYSTEM CENTER INC	28 17	22.5	-0.3	-1.1
N	SYS. SOFT INC	23 12	31.75	-9.5	-30.4
Q	WORDSTAR	3 1	0.938	-0.3	-21.0
Semiconductors					
N	ADV MICRO DEVICES INC	11 7	7.625	0.0	0.0
N	ANALOG DEVICES INC	13 8	8.5	-0.5	-5.8
Q	ANALOGIC CORP	11 8	8.75	0.0	0.0
Q	CHIPS & TECHNOLOGIES INC	26 14	16.5	0.1	0.6
Q	INTEL CORP	38 25	37.625	1.5	4.5
Q	MICRON TECHNOLOGY INC	35 9	6	-0.8	-8.6
N	MOTOROLA INC	64 60	59.875	-1.4	-2.2
N	NATL SEMICONDUCTOR	9 8	8.125	-0.5	-7.8
N	TEXAS INSTRS INC	47 35	35.625	-0.8	-1.4
A	WESTERN DIGITAL CORP	15 9	9.875	0.5	5.7
Peripherals					
Q	ALLOY COMP	3 1	1.625	0.5	44.4
N	AM INTL INC	8 4	4	0.1	3.2
Q	AST RESH INC	19 7	14.125	0.5	3.7
Q	AUTO TROL TECH CORP	6 4	5.625	-0.4	-6.8
Q	EMACTEC INC	26 10	14.875	-0.3	-1.7
Q	CIPHER DATA PRODS INC	11 4	6.5	-0.1	-1.9
A	COGNITRONICS CORP	6 3	4.875	-0.8	-13.2
Q	CONNER PERIPHERALS	10 7	13.625	0.4	2.8
A	DATAPRODUCTS CORP	18 7	7.125	-0.8	-9.8
A	DATARAM CORP	13 7	8.8	0.1	1.2
N	EASTMAN KODAK CO	92 40	40.25	-3.0	-4.7
N	E M C CORP MASS	9 3	4.375	0.8	20.7
Q	EMULEX CORP	12 9	9	-0.1	-3.0
Q	EVANS & SUTHERLAND	28 10	21.25	-0.8	-2.3
Q	ICOT CORP	3 1	1.375	0.1	10.0
Q	INTER LEAF INC	10 9	9.125	-0.1	-1.0
Q	OMEGA CORP	4 2	3.5	0.2	6.5
Q	LEE DATA CORP	4 1	2.125	0.3	6.5
Q	MAGNETOR SYS CORP	4 2	2.063	-0.2	-8.8
Q	MAXTOR CORP	12 7	9	0.9	10.8
Q	MICROPOLIS CORP	9 3	4.5	0.5	12.5
Q	MINISCRIBE CORP	6 0	0.313	0.0	0.0
N	MINNESOTA MNG & MFG CO	84 61	61.125	-1.1	-1.4
Q	PERSONAL COMP PRODUCTS INC	9 4	3.813	-0.1	-1.6
Q	PRINTRONIX INC	10 7	10	0.0	0.0
N	QMS INC	13 7	13.125	1.3	10.9
Q	QUANTUM CORP	17 6	11.375	-0.8	-7.1
N	RECOGNITION EQUIP INC	13 9	8.375	-0.9	-12.1
Q	REXON INC	9 8	8.625	-0.1	-1.9
Q	SEAGATE TECHNOLOGY	16 9	15.625	0.0	0.0
N	STORAGE TECH CORP	23 13	15.875	2.0	14.4
Q	TANDON CORP	1 0	0.75	0.1	8.5
N	TEKTRONIX INC	24 16	16.125	0.1	0.7
Q	TELEVIDEO SYS INC	1 0	0.313	0.1	25.2
N	XEROX CORP	28 54	55.75	-1.0	-1.8
Leasing Companies					
Q	AMPLICON INC	119 9	9	-1.0	-10.0
N	CAPITAL ASSOC INTNL INC	9 4	4.125	0.1	3.1
N	COMDISCO INC	24 21	23.625	-0.8	-3.6
Q	CONTINENTAL INFO SYS	2 0	0.203	0.0	-13.2
Q	LDI CORPORATION	16 12	15.75	-0.8	-1.9
Q	PHOENIX AMERN INC	9 3	3.25	-0.1	-3.7
Q	SELECTERM INC	8 5	9	-0.3	-4.0

EXCH: N—NEW YORK; A—AMERICAN; Q—NATIONAL

Street talk

Investors voice joy and sorrow over firms' earnings reports

It's earnings report time again, and Wall Street is ready with laurels for companies that delight and knockout punches worthy of George Foreman for those that disappoint.

Digital Equipment Corp. was in the latter category last Thursday, announcing a worse-than-expected 44% profit drop that sent its stock down 5⅛ points to 82 — off 2⅛ points from the week's opening. But Microsoft Corp. trumpeted a 57% earnings gain, and its shares soared 7½ points to 95, up 8⅝ for the week.

Investors, expecting bad news, were kinder to IBM. The company took a 1¼-point hit Wednesday after its earnings report but still closed up 1⅛ points for the week at 99½. Apple Computer, Inc., which announced a work-force reduction, fell 1⅛ to 32⅜.

The week after the market's 71-point drop on Jan. 12 was kinder and gentler to Lotus Development Corp., up 3 points to 29 ¾; Sun Microsystems, Inc., up 1⅛ to 17; and Convex Computer Corp., up 1⅛ to a new 52-week high of 17¼.

AT&T's stock was only slightly bruised by the effects of its network software problems, losing ⅞ of a point to close Thursday at 42¾.

CLINTON WILDER

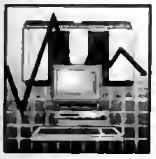
IBM, DEC draw mixed reviews

BY NELL MARGOLIS
CW STAFF

IBM and Digital Equipment Corp. delivered respective fourth-quarter earnings reports last week that failed to beat Wall Street's modest revenue expectations and could not meet the Street's equally modest profit estimates.

However, a bland quarterly report from IBM was a relief after a year dotted with unpleasant shocks, said S. G. Warburg & Co. analyst David Wu. "Last year, IBM was black and blue," Wu said. "Now, they're starting to look like Big Blue again. One thing about hitting your head against a wall — it feels so good when you stop."

IBM announced that fourth-quarter revenue increased 2.3% to $20.46 billion. Net income, however, fell to $591 million, down 75% from profits in the comparable quarter last year and considerably lower than earlier estimates. The gap, said IBM, was caused by a whopping $2.42 billion quarterly charge chiefly attributable to the company's recently announced restructuring.



The response to IBM's numbers was upbeat, but DEC's performance was a downer to analysts who had expected better. "This wasn't a pleasant surprise," said Martin Ressinger, an analyst at Duff & Phelps, who cited DEC's 44% profit plunge to $155.4 million as "well below my estimates and those of the Street." Revenue for the quarter squeaked upward 0.2% to $3.18 billion.

DEC pointed to a raft of factors — its ongoing and painful product transition, economic softness in major U.S. and UK economies and a decline in Defense Department spending — to account for the unexpectedly steep drop in net income for its fiscal second quarter, which ended Dec. 30.

"Maybe 'disaster' is too strong a word, but this certainly does not look like a growth company to me," said one analyst who asked not to be identified. Others, however, inclined toward suspended judgment.

"Clearly, [the extent of DEC's earnings decline] is a disappointment," said John C. Dean, an analyst at Salomon Brothers. "But the overall environment is no different from what we've been predicting, so why should we be surprised?" DEC's problems, he said, are well documented, widely shared and not the sort that can be turned around swiftly.

Ironically, Ressinger added, "One thing I find encouraging for [DEC's] longer term is a factor that will no doubt dictate disappointing numbers again in at least the current quarter — and that is that spending is going to be relatively high." Among the big-ticket budget items, he said, are advertising, training and costs incurred in gearing up for the company's new and major systems integration contract with Eastman Kodak Co.

What is so encouraging about a beleaguered company totting up expenses? In addition to the fact that the investments are in areas that could produce huge paybacks, Ressinger said, pouring money into product development when the going gets tough is the DEC tradition. "This is DEC acting like DEC," he said. "They're not panicking and doing something foolish."

On the other hand, according to several analysts, IBM — 1989 numbers notwithstanding — is giving good cause to believe that it's doing something smart.

Ressinger said IBM struck enough encouraging notes to dim, if not drown out, the thudding sound of the profit drop. "For instance," he said, "double-digit growth in all three major product categories — the 3090 mainframes, AS/400 midrange and PS/2 microcomputer — offset concern."

John Jones, an analyst at Montgomery Securities, Inc., pointed to 9% growth in net income from the company's international operations on a 7.6% international revenue gain as heartening: "All of the sudden," he said, "there's some leverage!"

In addition, Jones noted, "for the first time in three years, there's positive revenue growth in the U.S. This tells me that IBM is doing something right."

Apple to squeeze costs and staff as sales drop

BY JAMES DALY
CW STAFF

CUPERTINO, Calif. — Apple Computer, Inc. countered a recent sales slowdown with a multipronged cost-reduction strategy that includes plans for its first major layoff in five years, according to a two-page letter circulated to Apple employees last week.

Chief Executive Officer John Sculley said the savings will occur through the elimination of an unspecified number of the 5,500 jobs at company headquarters, a drop in hiring, normal attrition, a rollback of certain perquisites and the transfer of some employees to field positions.

"We operate in a cyclical industry where even the most successful companies must have the flexibility to move quickly when times get tougher," the letter read. "This is one of those times."

Apple said that although revenue for its first fiscal quarter ended Dec. 29 jumped 6% over the same period a year ago to wind up at $1.49 billion, net income dropped 11% over the same period and sagged to $124.8 million.

Although Sculley's letter did not pinpoint how many jobs would be cut and when, some sources speculated that between 500 and 700 positions could be chopped starting within the next few months. Apple employs approximately 12,000 people worldwide.

Some analysts speculated that the moves reflect the influence of Joseph Graziano, who was brought in last June as chief financial officer and charged with increasing Apple's reputation in the investment community.

"It's certainly a step in the right direction on Graziano's part," said Thomas Galvin, an analyst at Shearson Lehman Hutton, Inc. in New York.

Apple has been pinched by the same slowdown that has hit the entire personal computer industry. Sales have been poor on the low end of Apple's product family, particularly the Apple II and Macintosh Plus lines, which had been popular in the educational and home market.

Further details on the measures include the following:

- Rescheduling of salary reviews, which will come every 12 months instead of every six months, reducing the frequency of raises. Reviews for executives will be postponed until 1991.
- A modification of the employee profit-sharing plan that ties in more closely with the company's achievement of business goals. Apple paid out $49.4 million in profit sharing last year, even though profits fell far short of expectations.
- The phasing out of company cars for senior U.S. managers by April 1 and the elimination of company cars from future compensation packages. About 100 Apple executives now have company cars.
- Consolidation of certain unspecified business operations and the transfer of some positions from headquarters to the field.

Forecast

CONTINUED FROM PAGE 1

according to Roetter.

Moreover, the struggle will be played out against a domestic economy that appears headed for its own short stay in the valley. A U.S. Commerce Department survey released last month forecast a 6.4% increase in capital spending by U.S. firms this year — a sharp fall-off from last year's 10.3% projected rise.

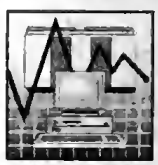
Diminished business investment, said Conference Board economist Ken Goldstein, "should impact — and fairly heavily — the computer industry." That impact may already be showing: Only 12 days into the new year, greater-than-expected inflation figures released simultaneously with lower-than-expected industrial sales sent the stock market 71 points south; the technology sector was among the first and worst hit.

But "if it's the worst of times for the vendors, it's definitely the best of times for the customers," said Dale Kutnick, president of market research firm Meta Group, Inc.

Vendors racing to differentiate their wares in a brutally competitive, commoditized market are handing users more choices, lower prices and easier access to support and maintenance than users used to dream of, Kutnick said.

Ultimately, however, users have more to gain from an industry on the rise than from one on the run. Therefore, it should come as good news for them as well as for their beleaguered suppliers that industry observers widely view 1990 as the end of the beginning of the U.S.-based computer industry, not the beginning of the end.

- The overall economic forecast should turn sunnier as the year wears on. "This is a dip," Goldstein said. Take the worst case, a recession: we're looking at six to nine months at the most and not very deep. Even the Henny-Pennies who are looking for the sky to fall don't see anything like 1980-81."



- Impending new uses of information and new classes of users will generate a thriving supply side. In the coming months, Roetter said, "more and more companies will follow the example of the finance and airline industries, basing their own competitive strategies heavily on information."
- Technological invention — the fuel that powered the first great wave of the computer industry — is far from over. "For example," said Montgomery Securities, Inc. analyst John Jones, "at some point, full-motion video will become an absolutely incredible consumer of technology."

According to Jones, for those who define "computer industry" as a group of companies selling hot boxes and canned applications, the computer industry is indeed on its way out. But for those not stymied by semantic shifts, the industry is on its way back — or, at least, will be by the time we are once again warming up our renditions of "Auld Lang Syne."

Many happy returns

Even as many current computer customers take time out from buying to attempt to digest and deploy the technology already on board, some of the slack is about to get taken up by users who find that computing, like love, is more beautiful the second time around, said John Logan, an analyst at Boston-based market research firm Aberdeen Group.

Two groups, he said, should prove rich sources of revenue that will help boost the industry into comeback mode: those formerly frightened but now lured by the ubiquitous presence of the desktop box, and the victims of personal computer oversell — potential users who joined the swarm to PCs but did not know what to do with them once they had them.

Richard Segal is one of them. Four years ago, Segal — assistant manager of the Dean Witter Reynolds, Inc. San Francisco sales office — bought an IBM Personal Computer clone "from a firm that's now out of business. I wasn't sure what I wanted to use it for, "but prices were going down and down; when I found I could get what I wanted for around $1,750, I jumped."

However, he never really landed. Now Segal is ready to tackle the keyboard once more: "I could set up something with windows and a direct connect to the telephone and automated office functions — and bif bam boom!"

NELL MARGOLIS

Secrets theft

FROM PAGE 1

MASNET computer network to Poulsen by electronic mail. In November 1987, Poulsen illegally retrieved classified information about a military exercise that was to be conducted at Fort Bragg, N.C., from the computer, according to the indictment.

It is the first time that the U.S. government has publicly acknowledged the theft of classified information stored in its computers, said Robert Campbell, president of Advanced Information Technologies, a Woodbridge, Va.-based computer security consulting firm.

"It's a startling revelation," Campbell said. "Up to now, the government has contended that it was not possible to dial into its computers, but apparently, the hackers found a way to do that."

However, Susan Hansen, a Pentagon spokeswoman, said that while Poulsen had a classified document "it should not be inferred that it was gotten by hacking."

Poulsen is also charged with stealing a computer printout from a Pacific Bell office. The printout was part of a contract with the FBI that contained telephone numbers of Ferdinand Marcos and his associates as well as cable/pair assignments. The phone numbers were the target of an investigation by the FBI.

The trio was employed by SRI International, a respected consulting firm in Menlo Park, Calif. Poulsen and Gilligan left SRI; Lottor was employed there as of last week, according to Donn Parker, a computer security expert at SRI. He said he was unable to comment on the investigation beyond that. He declined to say what positions the three held at SRI but added that they were not involved in security consulting work.

Poulsen and Gilligan have also worked at Sun Microsystems, Inc. as computer programmers, a spokeswoman confirmed last week. She declined to comment further on the investigation but said that Gilligan was employed with the firm as of last week.

POULSEN AND LOTTOR carried out part of the conspiracy from the living room of their Menlo Park apartment, which they called the "switching room."

Among several other activities detailed in the lengthy indictment, Poulsen is accused of retrieving unpublished phone numbers, including those of the Soviet Consulate in San Francisco, from Pacific Bell computers.

Law enforcement officials also alleged that Poulsen eavesdropped on telephone conversations between two Pacific Bell security employees who were investigating the case.

The indictment also alleges that Poulsen used sophisticated burglary tools, including latex surgical gloves, powered graphite and key-cutting equipment and a forged Pacific Bell employee identification card to steal telecommunications equipment, access codes and manuals from Bay Area Pacific Bell offices.

The three used the stolen access codes to make telephone calls without having to pay for them, law enforcers said.

Poulsen and Lottor carried out part of the conspiracy from the living room of their Menlo Park apartment, which they called the "switching room," where they stored much of their stolen equipment, the indictment said.

Officials at Pacific Bell also declined to comment on the investigation. "The point that I would like to make is that the environment now is different than what existed when this case started [in 1985]," said Jack Hancock, vice-president of systems. "There is a heightened awareness of the issues of systems security."

The indictment is one of the first under federal computer statutes directed at computer-related crime, according to federal law enforcers.

If convicted, Poulsen could be sentenced to 37 years in prison and fined $50,000. He is believed to be a fugitive in the Los Angeles area, according to federal law enforcement officials. Lottor and Gilligan could each be sentenced to 20 years in prison and fined $30,000. They are expected to surrender to federal authorities in San Jose.

West Coast Senior Correspondent James Daly contributed to this report.

Campeau

FROM PAGE 1

might require a breakup of the company, or selling off parts of the company," said Perry Harris, a senior industry analyst at The Yankee Group in Boston.

"Where everything is now centralized, a couple of years ago [IS] was running pretty autonomously for stores like Bloomingdale's," Harris noted. "Should any components be sold off, that could pose some problems."

A centralized IS operation is "like Humpty-Dumpty — best kept in one piece," said Peter Kastner, vice-president at Aberdeen Group, a consulting firm in Boston. "Breaking it back up and downsizing to smaller business units is difficult, expensive, time-consuming and risky, even without a federal judge looking over your shoulder."

Data center operations often suffer the same dislocations and insecurity as the rest of a bankrupted business, Kastner added. "A bankruptcy can put a lot of pressure on IS systems," he said, "Normal operations, like accounts payable, end up in a frozen legal limbo."

A year-long conversion project can exhaust the IS staff, sometimes to the point of demoralization. Throw in a bankruptcy at the tail end of such a job, and the resumes start heading out, Harris said.

However, The Sabre Group Chief Executive Officer Glen Griffith, maintained that bankruptcy proceedings would have no effect on his wide-reaching IS operation.

Sabre does it all

The 722 people employed at Sabre handle processing for the Federated and Allied stores with two IBM 3090 Model 600s and one 3090 Model 400E. The processing load encompasses everything from accounting applications to sales planning, delivery scheduling, inventory and stock control, and payroll.

"We do it all. There is nothing at the individual stores," said Griffith, who declined to discuss his operation in further detail on instructions from his corporate headquarters.

With nine retailing chains, Allied and Federated employ nearly 100,000 people under the new corporate name of Federated Stores, Inc.

The stores are known throughout the nation, from The Bon Marche in the Pacific Northwest to Stern's in the New York area, Burdine's in Florida, Lazarus in the Midwest and Rich's/Goldsmith's in the South.

"It's not like anybody can just pull the plug on us," said Jared Balzer, microcomputer manager at The Bon Marche in Seattle. "The brains for our equipment is sitting in Atlanta. I don't know what the outcome will be, but I feel confident our systems will continue to run like always, with no problems."

Balzer recalled how The Bon Marche's IBM mainframe was dismantled and set out, in pieces, in the hallway by his office as the centralization project got under way. "We converted all our mainframe programming to Sabre. It changed everything entirely within the period of a year or so," he said.

The only processing The Sabre Group does not handle are the microcomputer applications that fall into Balzer's bailiwick.

"My realm has continued to grow," he said of his 300 users. "We have micros running day in and day out, with spreadsheets, word processing, lots of things we don't want to tie up the mainframe with."

Company officials refused to speculate on how a reorganization plan might affect their information systems.

Motorola introduces 68040 high-end chip

BY JAMES DALY
CW STAFF

AUSTIN, Texas — Motorola, Inc. will introduce the next high-end generation of its popular 68000 microprocessor family today, but don't expect systems based on the 68040 until the frost is on the pumpkin.

Although sample quantities are available and support for the 25-MHz chip is already widespread, volume shipments will not begin until midyear, and natural product development cycles will likely delay introductions until the fall, said Jim Reinhart, manager for the company's 68000 line.

The 040 is Motorola's most sophisticated microprocessor yet, with more than 1.2 million transistors on a single sliver of silicon. Its multiple execution units enable it to process 20 million instructions per second and 3.5 million floating-point operations per second, Reinhart added. The chip took two years of development and between $50 million and $70 million in research and production costs, he said.

Twenty-one companies in the U.S. have plans to incorporate the $795 32-bit chip into products, including Apple Computer, Inc., Hewlett-Packard Co., NCR Corp., Concurrent Computer Corp. and Control Data Corp. Additionally, HP plans to demonstrate how the 040 can be swapped into its Model 370 workstation at this week's Uniforum show in Washington, D.C.

The 040 also represents Motorola's latest offensive weapon in an increasingly crowded field of high-performance microprocessors, including Intel Corp.'s 1486 and an array of reduced instruction set computer chips produced by firms such as Sun Microsystems, Inc. and Mips Computer Systems, Inc.

Chip shot

Motorola claims its latest microprocessor, the 68040, beats Intel's 1486 and Sun's Sparc in both price and performance

68040: Competitive comparison

	Motorola 68040	Sun Sparc	Intel 1486
Performance in MIPS at 25 MHz	20	18	15
Performance in MFLOPS at 25 MHz	3.5	1.2	1.0
Price	$795	$1,735	$950
Dollars per MIPS	$39.8	$96.4	$63.3

SOURCE: MOTOROLA, INC. CW CHART: DARREN HAMLE

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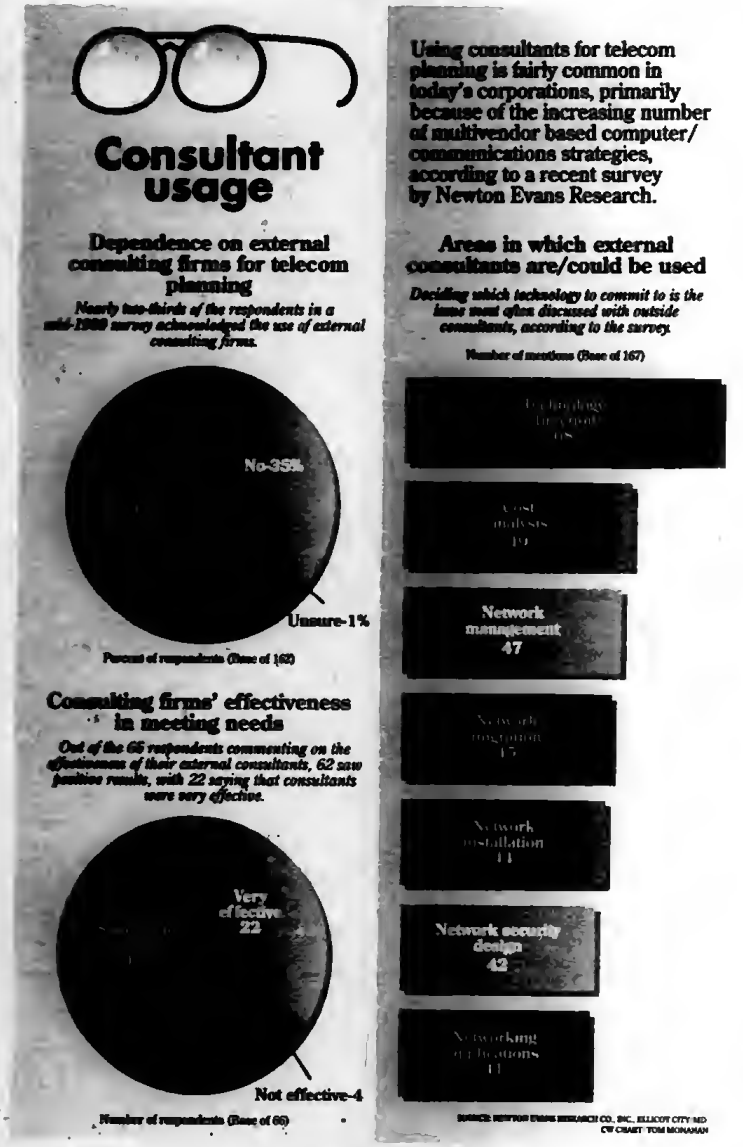

INSIDE LINES

We can't do business together

"I would never hire Robert T. Morris and would never do business with any firm that hired him," Purdue University professor Eugene Spafford said after testifying for the prosecution in the Internet worm trial last week. After hearing that Morris had been briefly employed at Saber Software, Inc., a software developer in Cambridge, Mass., following the worm attack, Spafford said, "That's interesting, I was just talking to Saber about buying some of their things." Meanwhile, Saber Vice-President Stephen Kaufer sidestepped the question of whether he would rehire Morris by saying he would "recommend him without hesitation" to a prospective employer.

Well, you got to have friends

Among observers at the Morris trial were Ken Thompson and Doug McIlroy, both of whom are computer scientists at AT&T Bell Laboratories. McIlroy is one of the inventors of a game called "Darwin," whose aim was to create a worm program that would replicate and outmaneuver an opponent's worm. One of the other inventors of the game was Robert Morris Sr. "He always won," McIlroy said.

Grit and bear it

In the wake of a doom and gloom story in *The Wall Street Journal* last week, exasperated Lotus executives want it known that its 1-2-3 for the Mac project is alive, well and on target. "Everyone thinks it's late because it was preannounced in 1987. So until it ships, we'll just have to grin and bear it," said Lotus Vice-President Frank Ingari. He did confirm a recent change in project leadership.

Goosing the gander

While Sun Microsystems preaches the joys of open systems and actively encourages Sparcstation clones, that one-big-happy-family doctrine apparently does not spread to the Sun User Group (SUG). The election of an employee of clonemaker Solbourne to the SUG board was nixed at the eleventh hour by Sun execs, sources said.

On the lighter side

It was all smiles and jokes among the fancy hatbox lunches at the Sun-Lotus unveiling last week. "Sun is now a legitimate computer company, and Unix is not just for engineers anymore," Sun President Scott McNealy said with a grin as he wiped out the last two years worth of marketing campaigns. Asked later how much business Sun has lost because it couldn't run 1-2-3, McNealy replied, "Well, Jim tells me it's millions."

Uni-partnership?

Unify plans a Uniforum splash for a version of its Accell/SQL for Informix's relational database management system. Unify says the ink has not yet dried on a joint marketing contract between the two firms. But Informix is still wondering what Unify's talking about. "I read the agreement they sent us and decided we weren't going to do the deal," said Informix executive Steve Hill. Meanwhile, AT&T says it plans a Uniforum announcement of a "direction" to develop a Unix V product that will support OSI, including applications such as FTAM, and run on top of ISDN.

Fujitsu Data Systems?

Will Amdahl follow National Advanced Systems down the path to Japanese ownership? Amdahl could go the way of NAS, now known as Hitachi Data Systems, and have its Japanese supplier buy it out, according to at least one financial analyst. Fujitsu could break its 10-year agreement with Amdahl in the second quarter. Amdahl has been suffering from pressure on its profit margins from price-cutting from IBM. According to the analyst, it would be a cheap buy for Fujitsu.

It's Veritas: *You might say that Robert T. Morris has turned from worm author to something of a bookworm. During testimony last week, he said he's been working as a programmer in the Classics Department at Harvard University since last August. If you have truths stranger than fiction, call 800-343-6474 and start News Editor Pete Bartolik off in the right direction.*

NEXT WEEK

Four years ago, Rank Xerox (UK) initiated major business changes supported by cross-functional systems. Now, **Paul Chapman**, the architect of those systems, is working on assignment in the U.S. with Patricia Barron, Xerox's director of corporate information management. Executive Report details their use of IS as a tool for change.


ANDY FREEBERG

At American Express, the payoff for new technology — specifically, Integrated Services Digital Network — is calculated in terms of improved customer service. A report on exactly how this company meets the dual challenges of cost and risk justification for this kind of leading-edge technology appears in Manager's Journal.

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